The Builder.

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Practical Education in Art.

WE have applied the above qualifying phrase to a consideration of the views put forth in a book by Mr. C. G. Leland, of which the main title is, in fact, "Practical Education" simply,* because it is in regard to the portion concerned with artistic training that we especially desire to speak. The remarks made by Mr. Leland in regard to the cultivation of memory, especially the memory for what is seen and the habit of mentally picturing things from memory, are very interesting and valuable, and we entirely accept his view as to the extent to which the memory for things seen may be cultivated and strengthened far beyond the standard of acquirement which most of us are too apt to be contented with. But this, though it has its bearing on art, is more especially a part of general education. A considerable portion of Mr. Leland's book, however, is in fact devoted to the subject of early artistic training, or "Industrial Art Education," the subject which, he observes, though it should logically have come last in his book, he has put first, because it is at present being earnestly studied and is of great popular interest.

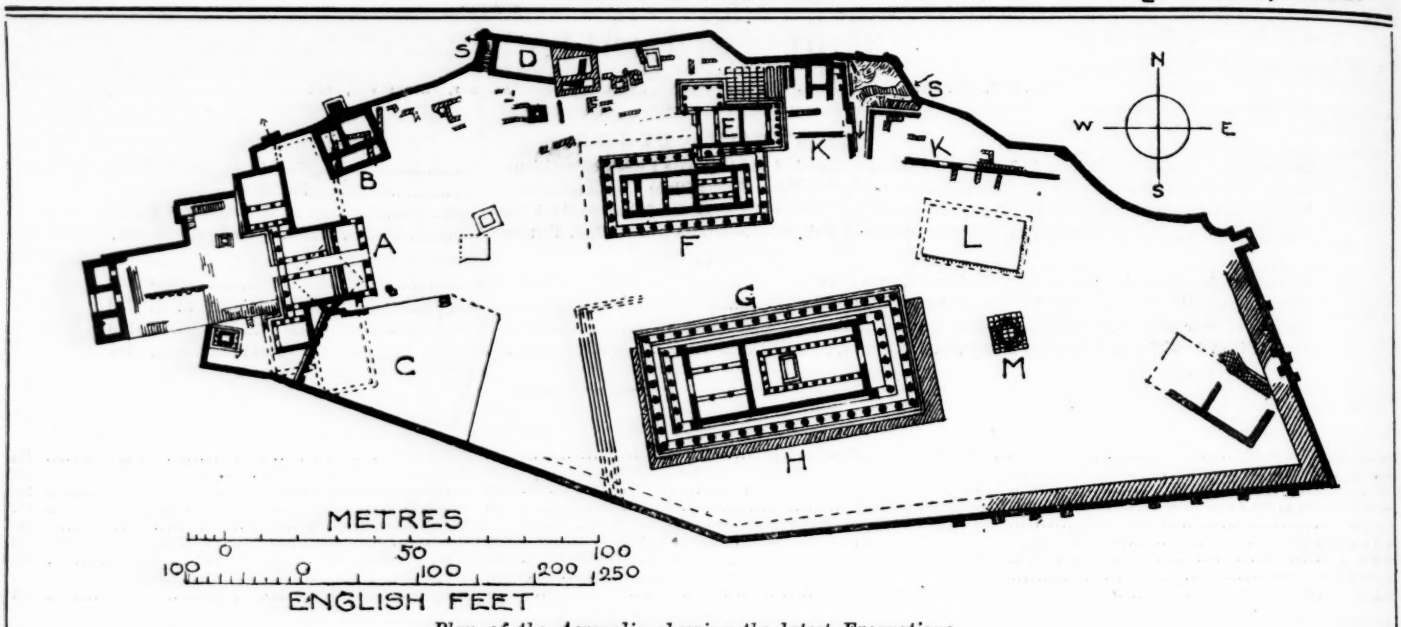
Mr. Leland's main point is one that has often been urged in our columns, that all or nearly all children can be taught to draw (he says, as easily as they can be taught to write), and that it is the more valuable and requisite branch of primary education of the two. Whether it can really be taught "as easily" as writing may be a question; at all events, the capacity will vary to a certain extent in different children; but that the capacity to draw and even to design s far more general than is commonly supposed we have no doubt at all, any more than that it is one of the faculties which ought to be first exercised and brought out in any system of primary education.

Mr. Leland's central principle is that all art,—indeed, all industrial work,—really centres in the one accomplishment of knowing how to design. This, he observes, reduces all the arts to one. "You only want to know how to design your patterns to do all these things," said a boy of fifteen in his school to another. By "these things" he meant modelled faïence, wood carving, and a dozen other arts. Mr. Leland avers, and we are both willing and desirous to believe him, that those who have been taught design acquire not only a cultivation of taste, but a confidence in themselves and in their own abilities, which makes them "sure to succeed in any kind of work"; and he goes on to say, very truly, that a boy, or even a grown person, unfamiliar with the processes employed, and who sees under-glazed coloured faïence vases, covered with garlands and monsters, carved and inlaid panels in cabinets, brass plaques, mosaics, &c., is at first rather in awe of the genius supposed to be necessary to produce all this. "In a few weeks or months the youth moves in this little art-world with the utmost indifference, and criticises the works closely. He is quite sure that if he now tried he could make, or even design, any of these fine things." There is a great practical truth in this. *Omne ignotum pro magnifico.* It is a great thing to break the charm early by bringing a boy or a girl into the midst of industrial art-work, and let them see that these things, which appear so wonderful when they only regard them as outsiders, are made by boys and girls with the same fingers and with the same mental abilities as their own, and that they only want practice and familiarity to be able to do the like.

Mr. Leland tells us, and the account is encouraging, that he found children took to decorative design, in its first and simplest forms, as naturally and quickly as to any other sort of play or amusement. "It is about the same thing to an ordinary girl of ten or twelve whether she works at mud-pies in the road or at modelling a vase in a studio. One soon becomes as easy as the other." We should take this, we confess, with a little reservation; but we can imagine it to be true with a large proportion of children. And hereupon the author sketches a future which indeed is perfectly possible of fulfilment, when a large number of people shall have been trained to execute original artistic work with their hands, and when with the increasing perception of the value and interest of hand labour, there will be a demand for it as in opposition to machine labour. People are beginning to learn, says the author, that no real work of *art* can be made by machinery. "The vulgar and ignorant call everything which is beautiful and artificial *artistic*"; the educated know that the term is only applicable to a work which shows the direct art of a maker and the action of a mind. With the increase of culture there will come not only an increased demand for decoration, but also for that which is hand-made, and then a very large proportion of those who are now idle will find work to do." But will there be the money to pay for it? That is one question which Mr. Leland rather leaves out of sight. If we suppose an increased taste for and appreciation of handwork, no doubt those who are first in the field, and who first learn to produce by hand works of so-called "art" which are now produced by machinery, will have a fine field open to them; but Mr. Leland seems to forget that there is a limit to this; that if all children, as he would desire, learn industrial art as among their earliest studies, they cannot all earn a livelihood by purchasing each other's works. The author's entire oblivion of this demand and supply aspect of the subject is almost amusing; he keeps repeating, in slightly-varying words, that every boy or girl who has learned design is sure of being able to make a living, as if this were an eternal condition of things, instead of being, as it is, merely a consequence for the present of the comparativly limited number of art-workers by hand.

In Mr. Leland's chapter on the method of teaching design as a preparation for industrial art work, there is a great deal that is admirable, mixed with some things that are more or less open to question. In his remarks as to the importance of freehand drawing, and of the most "free" hand possible, using the pencil with a sweep from the shoulder rather than from the wrist, and drawing lightly on the paper a thin, clean, unbroken line,—all this advice is excellent; but when he adds that "the whole difficulty of drawing lies not, as is popularly and very ignorantly supposed, in composing and inventing figures, but in drawing simple lines," he is overstating what is a truth up to a certain point. It is quite true that the first thing to be learned is the faculty of drawing a fine clean line; but to say that this is a greater difficulty than that of invention, is a paradox, and a rather mischievous one. We must also protest against the easy and mechanical theory that to double a form is to more than double its beauty; and that any form, even the ugliest, when balanced by its double, will become ornament. This is a mischievous heresy, the following of which results in a cold, formal, mechanical style of symmetrical design. Nor can we entirely

* Practical Education: treating of the Development of Memory, the increasing Quickness of Perception, and Training the Constructive Faculty. By Chas. G. Leland, late Director of the Public Industrial Art School of Philadelphia. London: Whittaker & Co. 1888.



Plan of the Acropolis, showing the latest Excavations.

A.—The Propylæa.
B.—Treasure-house.
C.—Artemis Brauronia.
D.—Stoa.
E.—Erechtheion.
F.—Old Temple of Athene.
G.—The Parthenon of Pericles.
H.—The Building of Cimon.
K K.—Palace.
L.—Altar of Athene.
M.—Temple of Rome and Augustus.
S S.—Flights of steps.

reconcile with the author's great emphasis on sweep and freedom of hand and large scale drawing (in all which we quite concur with him), his mechanical method of designing for a young worker in needlework,—"it does not take a child long to learn that with a teacup, a coin, and a pencil she can draw a semicircle stem with from one to three grapes at the end, or that the stem may be made double, or with two lines." This seems to us to be just teaching the child wrong from the very beginning; teaching her that the shape of grapes is that of coins, which it is not, and that drawing is tracing outlines round the edges of objects, which it is not; and the curious thing is that the suggestion is totally at variance with the bulk of the author's teaching about freehand drawing. It is almost as if he meant us to think, teach a child to draw objects *somehow*, never mind how, so only that he (or she) draws. But there is no such magic in the mere fact of drawing lines on paper, that it should operate on the mind even when it only consists of mechanically drawing them round the edges of objects chosen to guide the pencil, and without even any correct resemblance in outline to the objects they were supposed to enable the child to represent. One of the very first maxims in drawing should be, draw a thing as you see it, not according to any conventional or mechanical method of producing a resemblance. Nor, again, is it true in every sense that "if you want to prevent a girl being an artist, set her to flower-painting." This only applies really to the ordinary careless school flower painting,—"pretty" painting, without any attempt to get at the reality of the subject. Let flowers be drawn and painted with an earnest endeavour to get at their whole beauty and at the secret of it, and this is as good a lesson as any other in drawing and colour,—better than many; and after the essential beauties of the flower in its natural form are mastered, then might come the adaptation of the flower in design. It is absurd to say that painting flowers in itself is injurious to artistic power; it is painting them in a bad and commonplace way, and only up to a commonplace standard, that is injurious; and that, no doubt, is the way that too many girls are taught or allowed to paint them.

We may also suggest that in his anxiety to emphasise what is no doubt a great truth, that all design is *one* art and all has the same object and is developed on the same principles, Mr. Leland is apt to overlook at times the importance of considering the special qualities and capabilities of material. He speaks rather too much as if a design for one material must do equally well for another. This is certainly not always true, and the influence of material ought not to be overlooked.

The author, however, has done a good work in his own country, and the lesson taught in his book is one much requiring to be learnt in this country. If he is rather one-sided and narrow in his way of putting things in some respects, this is what often happens with men who have got steadily hold of a useful and practical idea, and have turned every faculty towards pushing this to its final result. There are points in Mr. Leland's book which one feels are open to a good deal of question and criticism in detail, but he has got hold of a central truth which is of immense value to education, and his book is deserving of the attention of all concerned in the education of children. We hope it will have a wide circulation, and its advice be largely acted upon in schools and families; for not only will an early training in design open to many fields both of enjoyment and of profit which might otherwise be for ever closed to them; but a general knowledge of design in childhood would be the greatest step of all towards making us more of an artistic nation, since it is out of the general common-sense of the nation that national artistic taste must be nurtured and developed, not merely from the special education of a small band of professional artists: as the author says in regard to the choice of copies for schools, "We want inspiration not from men, but from eras of culture"; and we want also an era of general culture, not merely a comparatively small band of specially cultivated "artists," to produce an "artistic age."

RECENT EXCAVATIONS IN THE ACROPOLIS.

THE object of the following paper and accompanying plan is to give a brief conspectus of the principal results obtained during the excavations of the last two years. From time to time we have called attention to successive discoveries, and it is now possible to give something like a general survey. We shall omit from the present account the series of archaic torsos, which some months back we discussed in detail.

With this provision the main results arrived at may be summarised as follows:—

1. The discovery of the old Athene temple.
2. The presence of the site of the Treasure-house in the north-west corner of the Acropolis.
3. Discovery of the foundations of the old kingly palace, near the Erechtheion.
4. The making out of a watercourse for the supply of the Acropolis.
5. Discovery of the temple to Roma and Augustus east of the Parthenon.

The first remains of the old Athene temple came to light in 1885: since then it has been thoroughly explored by Dr. Kabbadias, and fully discussed by Dr. Dörpfeld. The ground-plan is seen at F on the accompanying plan. It will be seen at once that three of the peripteral columns encroach on the Caryatid porch of the Erechtheion. This points to the interesting fact that the older Erechtheion was not built on the same plan as the Erechtheion at present extant. About these peripteral columns there is another important point. From considerations of material and style, Dr. Dörpfeld affirms without hesitation that the interior cella and the peripteral colonnade are of quite different dates. He thinks that the cella was built long before the time of Peisistratos, and that the work of the tyrant was only to adorn the old cella by the addition of the colonnade. The material used for the earlier portion of the work (the cella) is almost exclusively the hard blueish calcareous stone of the Acropolis itself, while that of the colonnade is the reddish grey, calcareous stone of the Peiræos. The masonry of the foundations of the colonnade is exactly similar to that of the Zeus temple at Olympia, and of the older Eleusinian temple, from which Dr. Dörpfeld thinks it may be securely dated as of the time of Peisistratos. Several fragments of sculptures supposed to belong to the pediments of this temple confirm by their style this hypothetical date. Enough remains to show that the composition consisted of a gigantomachia, in which the goddess Athene herself had a prominent place. The internal disposition of the temple is similar to, but by no means the same as that of the Parthenon. Behind the opisthodomos, it will be noted, are *two* small chambers entered from the west.

Turning to the Treasure-house (B), we note that its site has turned out to be in absolutely the opposite corner to where it was expected. Till now it was usual to identify with the bronze treasure-house, some fragmentary remains at the south-east angle of the Acropolis, near to the modern museum. The actual Treasure-house stood in the north-west corner; it consisted of a narrow portico facing the south, and behind this two chambers. The foundations are made of blocks of porous stone, and Dr. Dörpfeld assigns them to Cimon's time. From the plan it will be seen that had the north hall of the Propylæa been carried out according to the project of Mnesikles, part of the Treasure-house must have been pulled down.

Great hopes were entertained that the excavators would light upon some traces of the foundations of the old Erechtheion,—traces which might possibly explain the singular disposition of the present temple. These hopes were doomed to disappointment, but as a set-off the discovery,—a quite unexpected one,—has been made of the old palace of the Kings

of Athens. The foundations of this palace lie to the east of the Erechtheion, at K, and the plan, so far as at present made out, is distinctly analogous to that of the palace at Tiryns. The steps leading up to the palace on the north side, of which eight remain, are reported to be very similar to those at Tiryns. The architectural remains are unfortunately very meagre.

We have taken the discoveries in the order of their importance, but for the watercourse we must return to the neighbourhood of the Treasure-house. Beneath its foundations the explorers have come upon a cistern, hewn in part out of the living rock, in part built up with blocks of porous stone: it contained two chambers. The object of this cistern was, no doubt, to collect the whole rainfall of the Acropolis, in case,—*e.g.*, in a siege,—it should be cut off from the Klepsydra. The date of the masonry is said to be that of Peisistratos. Of later date, but previous to the Mnesiklean Propylæa, is a watercourse of porous stone, starting from the west wall of the Treasure-house and passing under the foundations of the north wing of the Propylæa.

Finally, to the east of the Parthenon, the foundations of a late Roman temple (M), undoubtedly that to Rome and Augustus, are now laid bare. The temple is built on the actual rock. It was of circular shape; it was dedicated originally to Rome, Augustus, and the Charites, and was probably a thank-offering of the Athenians; but under exactly what circumstances is not known.

Such are the principal points made out; but it must not be forgotten that a vast quantity of "unclaimed" architectural fragments have been found, which, when duly classified, will probably yield important results. Among them we may specially note fragments of a whole series of Ionic columns, some of them bearing dedicatory inscriptions, and destined to support votive offerings: they are of various dates.

NOTES.

WE give our best thanks to Lord Lamington for the attempt which he made on Monday to introduce and recommend the principle, which we have repeatedly urged, of the appointment of a permanent Directorate of Works in place of the foolish and unsatisfactory system of placing the management of Works and Public Buildings under a Commissioner who is changed with every change of the Government, thereby continually disturbing, for political reasons, the carrying out of works which especially demand continuity of oversight and direction by the same minds, and which have essentially nothing whatever to do with politics or changes of Government. How, Lord Lamington asked, was it possible that any special great work could be done when the system was such that in a period of thirty years there had been eighteen First Commissioners? How, indeed! More especially when it may be said that a majority of those Commissioners were men with no special understanding or knowledge of the kind of work they were appointed to direct, and some of them, in fact, would seem to have been specially selected for their ignorance and indifference in regard to all artistic or architectural work. Lord Lamington said:—

"He would appoint two eminent architects, men of high cultivation, as permanent officers of the Department of Works, and under their supervision we might expect something like continuity in the work of the department. It was hopeless to look for such continuity under First Commissioners who were changed with every change of Government. At any rate, the present ridiculous way of conducting important works ought not to be allowed to continue any longer, and arrangements ought to be made to obviate present inconvenience and to secure public buildings that should be worthy of the country."

The proposal to appoint two eminent architects as permanent members of the Department of Works, to look after the public works of the country, which seemed so unheard of a thing to some noble lords who took part in the discussion of the question, would be considered a perfectly natural proceeding in France, where it is understood that those who have given their lives to the study of architecture know a little more about it than other persons are likely to know; and at this moment we believe we are correct in saying that little is done or projected in this way in France without the opinion, formally or informally, of M. Garnier; and, of course, every one knows that there are a number of eminent architects acting as permanent architectural advisers in connexion with the Department of Public Works in that country. Here we appoint an amateur Commissioner every time the Government is changed, who knows probably nothing of the subjects he is charged with, and so far as he has any ideas, probably wishes chiefly to leave his mark in the office by altering everything that his predecessor had planned; or if he is more quiescent in character, he is in the hands of a permanent irresponsible Secretary, also an amateur. It would be difficult to conceive any system more ludicrously bad, or less calculated to ensure the efficient carrying out of the kind of work for which the Office of Works is supposed to exist. But it is a subject that in England nobody cares about; and we fear the only reward Lord Lamington will have for raising the consideration of the question is the proverbial but only partially satisfactory reward which is said to attach to a good conscience. Some day, perhaps, Englishmen will be taught a little more about architecture and the artistic side of life than they are taught now; and they may then know, when too late, what blunders they have been making for generations past.

MR. H. R. GOUGH, not content with demonstrating against this Journal *vivâ voce* at the Institute meeting on Monday night, has threatened us in an epistolary form with we know not what pains or penalties unless we withdraw or apologise for our remarks in regard to "misrepresentations." We fear we cannot oblige Mr. Gough so far as that; but we will do what is more to the point, we will give an example of the kind of thing we refer to, from the latest circular issued by his Committee. Accompanying the circular requesting signatures to a petition in favour of the Registration Bill is a series of printed quotations of various opinions in favour of such a Bill, some of them from mere nobodies who were never heard of before, but one is from Mr. I'Anson, the late President of the Institute of Architects, thus: "This is a very important question. It has been strongly pressed upon us from without. It is also clear that many amongst us think it a right step to take." Of course every reader not acquainted with the facts of the case would imagine that this represented an opinion of the late President of the Institute in favour of the Bill, or of its principle, at all events. But what is the fact? These are only the first words of a paragraph from the address delivered by Mr. I'Anson at the opening meeting of the present session, the remainder of which is as follows:—

"But the critics will ask, is it for the good of the public? Is this movement a disinterested one, or is it not? Is it to make a trades union of the profession,—to exclude all those who have not been admitted within the inner circle from sharing in the emoluments of those within? Will it really protect and guard the public from incompetent men? For my part, before venturing on any conclusion as to the desirability or the reverse of Registration,—whatever that term may imply,—I think that we may ask ourselves two very apt and pertinent questions: First, as to the form in which the Registration of architects may be best effected; and, secondly, whether the fact of having passed those examinations for admission to the Institute, now sanctioned by Royal Charter, and to which I have just referred, will not accomplish, to all intents and purposes, and sufficient for the present time,—the main object of Registration as contemplated by the Conference of May last."

It will thus be seen that the late President actually summed up completely against the measure of which it is attempted to persuade people by this circular that he was a supporter. The circular letter asking for signatures specially says, "on the back you will find set out a few of the opinions that have been expressed, and resolutions that have been passed, in support of such a measure." If this is not "misrepresentation," we do not know the meaning of words. We may add that one of the "resolutions" referred to is described as having been passed at a meeting "to which every architect in the kingdom was invited"; but not a word is said as to how many responded to the invitation!

THE debate on Friday, the 17th, at Liverpool in regard to the Liverpool Cathedral scheme ended in the acceptance, by a majority of eighteen votes as against eight, of a resolution by Mr. Fletcher Rogers to the effect "that the Executive Committee be requested to re-examine the St. Peter's Church site, and report to the General Committee as to its suitability for a cathedral adapted to the diocese of Liverpool." This means that the idea of a cathedral on a grand scale is dropped for the present; for none but a smaller one, about the scale of the Episcopal Cathedral of Edinburgh, would be possible on that site. The site is a suitable one enough in point of size, convenience, and accessibility for such a minor cathedral on the scale of St. Mary's, Edinburgh; but it can never be an effective site in an architectural sense: it is too flat, too low, and too confined and hemmed in by buildings for that. Several of the committee expressed great regret that there should be any idea of Liverpool being contented with a second-class cathedral or a mere cathedral church, and we cordially sympathise with them. If it is worth doing at all, it is worth doing on a grand scale for a town of the importance of Liverpool. The Reverend Canon Warr made the suggestion that the St. Peter's site might be utilised financially instead of architecturally by secularising it and disposing of it, stating that it was worth 200,000*l.*, which would go a long way towards the fund for a new cathedral. The practical objection to this idea, which was favourably commented on by another speaker, would seem to be that by the same rule, any other centrally-situated site should be worth nearly as much, and it would only be gaining money from one site to lay it out on another. We regret the result of the meeting, which seems practically to amount pretty nearly to shelving the whole scheme; but we hardly anticipated anything else. The real difficulty in the way of building a cathedral of the first rank in the present day is that the world is no longer so unanimous as it once was as to necessity or importance of great cathedrals. We may lament this, but it is no use shutting our eyes to the fact.

THE proposed Sanitary Registration of Buildings Bill, of which a copy has been sent us, is no doubt good in intention, but it is drafted in so extraordinarily loose and inaccurate a manner that it is likely, as it at present exists, to delay rather than hasten sanitary improvements. We meet with a blunder in the very beginning. It is called "a Bill for the better *Sanitation* of Dwelling-houses," &c. The word "sanitation" has no meaning in the English language. If it means improvement it may refer to windows as much as to drains. Again, clause 2 says, "the provisions of this Act shall come into operation." What is the difference between "provisions" and "the Act"? Of course, the draughtsman means "the Act." Clause 3 requires re-drafting. It should begin by stating that "a Sanitary Registration Authority under this Act shall be constituted as follows," and then go logically through the different bodies. Clause 4 is wonderful: "Each Sanitary Registration Authority constituted by this Act shall appoint its clerk *or some other person* as Sanitary Registrar." Perhaps its messenger or scavenger would be capable of keeping the "appropriate" books, whatever that word may mean. In clause 7 "shall" should obviously be read "may," otherwise the issuing of the certificates therein mentioned would be compulsory. Clause 12 is ridiculous, its phraseology is extraordinary, it proposes to condemn a corporation to imprisonment. Clause 14 speaks of the "date" of a sanitary certificate. It would puzzle an ordinary reader to know to what the date is to refer. Is it to be the date of signing of the certificate, or of its

issue? As regards principle, we think sec. 10 a mistake; the requirements for a sanitary certificate should be fixed by the Local Government Board from year to year, not be imbedded in an Act of Parliament; and the last part as to hospitals, clearly should be placed in a separate section. The intention of the framers of this Act is to carry out what for years past the *Builder* has been urging in and out of season; as, for example, when we called attention on Dec. 11th, 1880, to "The Sanitary Condition of Upper Class Lodging-Houses." We regret, therefore, to see desirable reforms hindered by what we have no hesitation in saying is the very worst drafted Bill we have ever seen, and which should be re-drawn by a competent person if it is to be seriously considered by the Legislature.

THE threat of a short water supply during the coming season is by no means confined to Liverpool; nor has the snow falling in February, followed by cold drying winds, done much by way of filling the springs. Snow, we are told by Mr. Symons, is so far inferior to rain as a source of terrestrial water supply, that a foot of it is only about equal to an inch of rain. The latter, moreover, rapidly sinks into the soil; while, in such weather as that of the third week of February, 1888, the greater part of the snowfall appears to evaporate. The Waterworks Committee of the Manchester Corporation report that at no time for many years has the stock of water at the commencement of the year fallen so low as it is now. Manchester, in 1883, consumed thirty-four million gallons of water per day, and the consumption has been increasing at the rate of 200,000 daily gallons per year. At Sheffield, in addition to the trouble about the lead poisoning of the water, fears are entertained as to the shortness of supply. The waterworks at Sheffield, which in 1883 had cost 1,693,000*l.*, and which then supplied 4,860,000 gallons per day, have been, it is said, recently purchased by the Corporation for the sum of 2,000,000*l.* The capital cost of providing water for Sheffield is, if so, as far as our information extends, higher than is the case in any other spot in the world. San Francisco was the exception to this comparison in 1883, but must succumb at present if the figures cited are correct. At Liverpool the water in stock at the end of January was only about one-fourth of that in January, 1887; and the rainfall over England in the month of January, 1888, has been much below the average,—in some districts not one-quarter of the average.

THE debate in the House of Lords on Monday last will, it is to be hoped, quicken the official mind as to the need for sanitary improvements at the Dublin Barracks. The report of Dr. Grimshaw and Sir A. Cameron practically condemns the barracks in toto. "The removal of a considerable portion of the present buildings was recommended, but with that recommendation they cannot deal at present," said the Under-Secretary of State for War. In other words, buildings which sanitary authorities have condemned so strongly that there is nothing which can be done to them but the pulling them down are to be tinkered at, with the certain result that they will be still unhealthy, and that the ultimate cost will be greater than if especial steps are at once taken. But perhaps the most striking point about the matter is that the improvement of the barracks was not taken in hand long ago. "The isolation of infectious diseases was recommended. There had been some difficulty in providing a hospital for these cases, but that difficulty had been removed and was now arranged for." "Arranged for," in official language, probably means will be carried out at some indefinite time. But can anything be more monstrous than that in the chief city in Ireland cases of infectious disease among the troops cannot be isolated, and that one of the cardinal and primary laws of health is thus violated by those who have charge of the troops. This short debate, indeed, reveals so shocking a neglect of sanitary precautions that we have no hesitation in saying that the state of every barrack in England and Ireland should be rigidly investigated by competent persons, and a report be made and submitted to Parliament.

IT appears that the cost to the Midland Railway Company of the recent engine-drivers' strike, as estimated by the Chairman (Mr. M. W. Thompson) at the half-yearly meeting last Friday, was about 38,000*l.* The loss incurred through such unfortunate disputes cannot, of course, be calculated with exactness, and the effect may be felt after the dispute itself is settled. There is a strong and keen competition for shipping, market, and other traffic for which prompt delivery is essential, and such an occurrence is certain to divert a considerable amount of this traffic, besides causing actual loss by way of compensation for delays. The latter item amounted, in this case, to 2,366*l.*, and the sum previously named is believed to include the traffic lost, as well as all claims and expenses. This represents a quarter per cent. per annum upon the ordinary stock of the Company, and it consequently proved a sufficiently serious item to influence the dividend. Another result was that the Company parted with a number of their *employés*,—some of whom had been for a considerable time in their service,—and it is certainly a matter for congratulation that such disputes are rare in this country. Another of the minor points alluded to at the half-yearly meetings is of some interest,—the effect upon the railways of a protracted fog. During the five days of fog which was experienced some weeks ago, one Company alone,—the London and North-Western,—had 3,700 men acting as special fog-signalmen; so that the total number employed at this work on the various lines would constitute quite an army. Makers of the signals had their stocks almost entirely cleared out, the number of these explosives used during the few days being something enormous; and King Fog must have been responsible for a very considerable and entirely unproductive outlay.

THE third of the series of tests* of the value of silicate cotton as a fire-proof protection for iron joists and girders took place on Wednesday last at the works of Messrs. Middleton & Co., Loman-street, Southwark, under the direction of Mr. Stanger, C.E., as on former occasions. The furnace erected for the trial was in full blast, at 2,000 degrees of temperature, at 11·22 a.m. There were placed over it three similar sets of two rolled iron joists. One was packed with silicate cotton coated externally with about an inch of "Salamander Compound,"—a plaster composed of plaster of Paris and silicate cotton. The iron joists were 5 in. in the web with 3-in. flanges; the sectional area of the girders and packing was 7 in. by 15 in. Another set of joists was embedded in a concrete formed of 1 to 5 Portland cement and sand, the sectional area being 7 in. by 14 in. The third set was covered by Doulton-Peto tiles, with the crevices and interspaces filled in with, and the floor surface formed of, concrete composed of half Portland cement and half sand. The under surface of the joists was coated also with $\frac{3}{4}$ in. of ordinary ceiling plaster. All the above sets of joists were fastened together only at the ends, where bolts passing through piping secured them at the proper distances apart. Each set was loaded with 30 cwt. of pig iron distributed over a length of 8 ft. The concreted joists were the first to give way, and they dropped down at 1·7 p.m. The Doulton-Peto tiles held out well until 3·40 p.m., when their joists succumbed. But the silicate-protected joists were practically unscathed after seven hours' endurance; for the deflection then did not apparently reach to a quarter of an inch; and there being no prospect of their giving way at 6·45 p.m. the fire was withdrawn. This is the most perfect endurance yet recorded.

A CURIOUS interference has lately occurred in the official supervision of the metropolitan gas and water supply. During the whole of January and part of the present month the gas-testing station of the Metropolitan Board at Camden Town has been reported as "closed on account of fever." Concerning the water-supply in the month of January, we find that Messrs. Crookes, Odling, and Tidy were unable on several days to estimate the "colour-tint" of the water owing to the prevalence of fog. A very ingenious instrument is employed by these chemists in measuring the proportions of brown and blue in the London water; but the fog has so far succeeded in throwing a veil over the possible imperfections of the liquid served out by the water companies, as to baffle all the powers of the "colorimeter." On the other hand, Dr. Frankland, viewing the water in a tube 2 ft. long, was able to detect a tinge of "pale yellow." But, of course, the companies can plead that this was the fog, and not the water. Why the fever stops the gas-testing remains somewhat of a mystery. Has the Camden Town gas examiner caught the fever, or is he afraid of catching it? Is there any danger that fever may so prevail in the metropolis as to close all the gas-testing stations? Would such an event have any effect on the illuminating power and purity of the gas. If not, what is the good of the gas-testing?

SO much attention has been paid to the great frieze of the Pergamene altar that the lesser frieze has been, outside the circle of specialists,—and, indeed, we might even say within that circle,—almost wholly neglected. This has been, of course, largely owing to the fragmentary condition of the composition. The two indefatigable sculptors, Freres and Possenti, have been latterly hard at work at the frieze, and have now succeeded in putting together all that will probably ever be made intelligible. Dr. Robert, in the last issue of the *Jahrbuch* of the German Institute (band ii., viertes Heft), published several of the slabs, with an interesting commentary. We should have been glad to have seen them published in some more adequate form than that of woodcuts, as, if our memory serves us aright, they seemed, when we saw the fragments lying in confusion at Berlin, to merit some more faithful process. We cannot here reproduce the details of Dr. Robert's commentary. The frieze represents scenes from the "myth" of Telephos,—a rare subject in ancient art, and it is the more interesting, as the sources of the sculptor's inspiration are manifestly tragic, *i.e.*, the two plays of Euripides, the "Auge" and the "Telephos," of which we possess fragments, and less certainly the "Mysians" of Sophocles.

THE same number of the *Jahrbuch* revives the long-mooted question of the restoration of the Apollo Belvedere,—a question which, so long as that meretricious statue maintains its hold on the popular imagination, will probably never fall out of date. Dr. Gercke makes a vigorous attack on the theory proposed by Dr. Kieseritzky, and long popular, that the god held an ægis in his left hand, a weapon he was brandishing against the advancing hosts of the Gauls when they beset his shrine at Delphi. This theory, it will be remembered, is entirely based on a bronze statuette in the Stroganoff Collection at St. Petersburg,—which is manifestly a reproduction of the Belvedere type, and in which the god holds in his left hand a piece of stuff or fleece of some sort. We heartily (from a personal examination) agree with Dr. Gercke that till the Stroganoff bronze is thoroughly cleaned (which, as it is in a private collection, it probably never will be) no theory can be based on it. Dr. Gercke would return to the old time-honoured restoration, and place in Apollo's hand his normal attribute, the bow.

A NOVEL type of power-tool has recently been introduced into this country from the United States. The inventor is Mr. MacCoy, who has come over to England to introduce the invention. The tool in question is guided by hand, but the motive power for driving it is compressed air. It may be used for cutting, beading, burnishing, planishing, and, in fact, in most situations where a quick reciprocatory motion is required. The cutting-tool is held by a suitable tool-holder. Within

* For some account of the previous tests see *Builder*, pp. 6, 68, *ante*.

the instrument is a small plunger, upon which the compressed air acts, causing it to vibrate very rapidly for about one-eighth of an inch. The tool-holder is pressed towards the plunger by a spring, and at each stroke of the plunger the tool-holder receives a blow, and thus the cutting or acting tool is caused to vibrate in unison with the plunger. The machine is said to run at a speed of fifteen thousand strokes a minute. It would be evident that such a rapid vibration could not be counted, but it has been determined by comparison with the note of a tuning-fork. The diameter of the plungers of different examples varies between 1 in. and 3 in., according to the nature of the work. A valve is carried in the plunger itself to control the admission of the air. No oil is required to lubricate the cylinder, as there is no contact with the plunger, the air admitted for motive purpose preventing metallic contact. The plunger and tool-holder are protected from the destructive effect of the rapid percussive action by the air being compressed between them at each stroke, and thus forming an elastic cushion, somewhat in the same manner as with Playor's planishing hammers. The tool is said to give most surprising results, taking cuts off sandstone like a planing-machine, grooving or chamfering marble as easily as if it were pine, and cutting wood with or across the grain with remarkable facility, leaving a smooth surface ready for polishing.

MR. LABOUCHERE, in *Truth*, complains that the committees which have been appointed to consider the accommodation for members in the House of Commons have been hampered by what he calls architectural tomfooleries, and he undertakes, although not an architect, to build a House at comparatively small cost, which would not be much larger than the present one, in which a pin might be heard to drop, while every member should have his seat, "and where every seat would be so good that I would willingly agree to take what might be deemed the worst for myself." Mr. Labouchere proposes to obtain this devoutly wished-for consummation by the simple expedient of running the benches up on a sharp angle and providing an entrance at the top of each gangway. Mr. Labouchere probably does not know that this question severely taxed the ingenuity of Sir Charles Barry and his two sons, Charles and Edward Barry, and that it is one not quite so easy of solution as he appears to imagine. If Mr. Labouchere will put his ideas on paper we shall be happy to give them publicity: he may perhaps be more successful than Lord Grimthorpe as an architect.

ARCHAIC SCULPTURE ON THE ACROPOLIS OF ATHENS:

ROYAL ACADEMY LECTURE.

'MR. A. S. MURRAY, Keeper of the Greek and Roman Antiquities in the British Museum, on Monday evening last lectured to the Royal Academy students on the archaic sculpture recently found on the Acropolis at Athens. He commenced by remarking that an Egyptian priest who claimed to have access to historical records of vast antiquity once told the Athenian law-giver, Solon, that some eight or nine thousand years before his time the Acropolis of Athens, instead of descending in steep rugged sides, had sloped gently down from the summit in grassy banks, where herdsmen dwelt with their herds; but that one day and night of rain, accompanied by convulsions of the earth, had washed the whole soil away from its sides and left it a great bare rock, much as it is to-day, except that it would now take another day and night of heavy rain to wash away the rubbish which of late years had been thrown over from the summit, greatly disfiguring the noble rock. Except for the vague speculation which Plato thus put into the mouth of an Egyptian priest, very little was known of the Acropolis until nearly the time when history began to be written systematically in Greece. In the year 480 B.C. it was the scene of a wild conflagration, after falling into the hands of the Persians, who set fire to the temples and overthrew whatever could be overthrown. After the glorious battles of Salamis and Platæa had been fought and won, and Greece was for ever rid of the Persians, the people of Athens returned, and set about rebuilding their homes and establishing again their industries, trade, and commerce. Prosperity flowed in upon them, and they conceived the idea of converting the Acropolis into a splendid memorial of the new freedom and new life which they had acquired through their defeat of the Persians. The result was an Acropolis such as had been indicated in a recently-made restoration. The beauty and grandeur of the sculpture and architecture we could still partly realise from the existing remains of the Parthenon, the Erechtheum, the Propylæa, and the Temple of Victory. But before these new buildings could be erected it was necessary to first clear away the ruins of the old. Some ancient statues of Athene were left standing, blackened with smoke and otherwise injured, but as to the rest of the ruins we had no knowledge till lately in what manner some at least of them had been disposed of. There happened to have been a convenient hollow between the site of the Erechtheum and the north wall of the Acropolis. Into that hollow a number of the old statues were hurled, and covered over so effectually that their existence was not suspected till lately, when, with a new desire of removing rubbish, they were brought to light amid much rejoicing. We had thus a clear and positive limit of time later than which these statues could not have been made. None of them could be later than 480 B.C., the date of the destruction of the Acropolis; and if it could be shown that some of them must have been sculptured in the generation immediately preceding that event, then we should be able to compare Athenian sculpture as it was just before the Persian invasion with the Athenian sculpture which at once thereafter burst into the freedom and glory of the works of the Parthenon. It was to these statues, found mostly in the hollow between the Erechtheum and the north wall, that the lecturer now had to call attention. For the most part they were draped female figures, more or less of the kind represented in the diagrams. He counted fourteen of them last spring, and some additions had been made to the number since then. They were figures more or less of one aspect, though differing considerably as to date. From their uniformity of aspect, and from the fact of their having been found together, it might be supposed that they had originally stood beside each other in some spot not far from where they were discovered. But whom they were intended to represent was far from clear. Many fragments of pedestals were found with them, inscribed with the name of the goddess Athene, and if these fragments belonged to the statues, then the statues had been placed on the Acropolis in her honour. But, if the statues were meant to represent her, it could not have been in her usual character, in which she wore a helmet and ægis and carried a shield and spear. It might have been in her capacity of Athene Erganè, the patroness of skilled industry. On the heads of several of the statues rose metal rods, which had served for the attachment of some object carried on the head. What that object was it was perhaps impossible to say; but if we compared the remains of Greek sculpture in general, we should hardly be able to find a better suggestion than that of a *modius* or cylindrical basket, such as was carried on the head by those figures which we called *canephoræ*. If the marble statues on the Acropolis, or some of them, had a *modius* on the head, we might regard them as prototypes of the famous Caryatids of the Erechtheum, which still stood close by (with the exception, of course, of the one now in the Elgin Room of the British Museum). In the Caryatids, it would be recollected, the *modius* on the head was reduced to something like the echinus of a Doric capital; while the action of taking hold of the skirt with one hand, but not pulling it aside, might be viewed as a later version of the archaic manner of distinctly pulling it aside, as seen in the diagram and in the other statues of the Acropolis. The figure in the diagram (fig. 1) was restored, holding a pomegranate in her right hand; but she might equally well (and perhaps more probably) have held a patera or circular dish. A figure with a patera held out in her hand could hardly be other than a priestess. Indeed, the archaic statues generally of the Acropolis were more like priestesses than deities. A noticeable feature in the lately-found statues was the brightness and variety of the colouring, which was employed on the borders of the dresses, on the diadems, and on the eyes and lips. On the borders of the dress the usual ornament was the mæander or key-pattern, more or less simple or complex. On the diadem the pattern generally consisted of a row of upright palmettes, like an earlier stage of the pattern known as the anthemion or honeysuckle. But these patterns were so set out on the marble, as to present sometimes a very agreeable combination of green, red, and white. In one of the borders the ornament consists of a row of chariot groups racing, one behind the other, like the prototype of a part of the Parthenon frieze. The lines, faintly incised in the marble, were still visible in parts, but the colours had faded. The principal colours employed in these statues were red, green, blue, and grey. These colours, it was to be remembered, were not employed to cover poverty of material. The marble was Parian, and from modern practice it would appear that nothing needed less aid from colour. But to the Greeks marble was as yet an unattractive substance, dug from the earth in large masses, and of no intrinsic value. They had been accustomed to sculpture in gold and ivory, silver, bronze, ebony, and cedarwood, more or less combined with a rich effect. The diagram (fig. 1) to which reference had been made was a restoration of one of the archaic statues, showing also the pedestal which had lately been proved to belong to it. On the pedestal were written the name of the person at whose cost the statue was erected, and the name of its sculptor, Antenor. The person who paid for the statue bore the well-known name of a vase-painter. More than that, the inscription told us that the sculptor himself, Antenor, was the son of a vase-painter, whom we also knew before from literary records, in which he was credited with a certain boldness of invention beyond his contemporaries. It might be remembered that Pheidias also was the son of a painter, and it was perhaps allowable to speculate that the influence of one art upon another, of which we heard so much in historical studies, might oftener than was supposed have taken a hereditary turn. But it was with the sculptor Antenor himself that we were now concerned. He had been known to us before, because of a certain bronze group which had become celebrated in antiquity from the strange vicissitudes through which it passed. It was a group which represented the two tyrannicides, Harmodius and Aristogeiton, striking down the tyrant Hipparchus in Athens in the middle of a great public ceremony. The group was carried off by Xerxes, and a copy of it was made, but by whom was not known, nor could we tell how far it followed the original motive. It happened that a group of tyrannicides was known to us from ancient copies; it had been recognised in two marble statues in the Museum at Naples; on a painted vase from Athens in the British Museum, and on coins. There had never been actual proof that the two Naples statues were ancient copies from the group by Antenor. Some had supposed them to be rather copies from the group substituted for it in Athens. Now that a statue of Antenor had been found on the Acropolis, there was, or ought to be, an opportunity of comparing the two, and perhaps deciding the matter. Before leaving the statue by Antenor, the lecturer called attention to two points, the first being the form of pedestal which the recent discoveries on the Acropolis showed to have been common in archaic art. Some of the pedestals were in the shape of a narrow short pilaster, connected by means of a sort of cymatium with an oblong plinth like the abacus of a column, on which the statue was placed, much as in the diagram. Others were in the form of a short fluted column, surmounted by a moulding and an abacus; but there was great variety in these mouldings which connected the abacus with the column; and the lecturer hoped that a Travelling Student of the Academy might by-and-by come back from Athens with drawings of them. The second point was the peculiar attitude of these archaic draped figures, holding the skirt of the dress a little on one side. It was a very general attitude in archaic Greek sculpture, but the lecturer did not remember having seen anything like it in the ancient art of other nations. What was its meaning? So far as could be gleaned from the poets, it was meant to be expressive of the gracefulness of slight action or movement. In

Fig. 2.

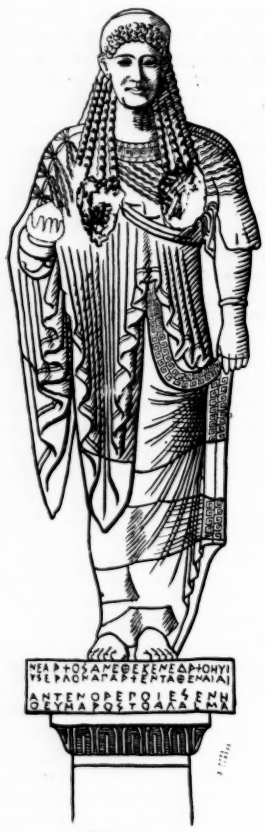


Fig. 1.

Fig. 3.

Diagrams illustrating Mr. Murray's Lecture on Archaic Sculpture on the Acropolis at Athens.

Roman times, when the passion for archaic Greek art had revived, we found that attitude of holding the skirt of very frequent occurrence in sculpture, particularly in figures of Spes or Hope, whence the attitude had often been described as "Spes-like." To the Romans as to us it was an attitude which at once recalled to mind the reserve, delicacy, and painstaking of Greek art. In the Athens of the period immediately preceding the Persian wars, Peisistratos was the most conspicuous figure, and he owed much of his success in establishing himself as tyrant of the city to his personal beauty and attractiveness. The vexation of the people at the stratagem by which he obtained entrance to the citadel did not take serious root. They were prosperous. The tastes of the times were such as to encourage industries and the minor arts. Everything tended to foster skill and handicraft. Peisistratos encouraged the public intelligence. He gave them a free library: the first thing of the kind that had been heard of. But amid all these circumstances favourable to skill and industry, there was no impetus to higher art. Nevertheless, there was much to urge on minute knowledge of details, precision, and grace in the rendering of the details, so that when the new dawn of artistic inspiration should come it would find everything ready that skill could do. The majority of the sculptures now found on the Acropolis had obviously the air of a period such as had been described. But one or two of them were much older. For example, one of the figures was rude to a degree that suggested a first attempt to work in the round by a sculptor who had previously had no training in that branch, but had been accustomed to the archaic manner of working in relief, from which he had acquired such knowledge as he possessed. Another of the statues was more advanced in the rendering of the face, both in regard to its forms and its expression, but the body was still of the perpendicular style which the Greeks designated as a plank. These two statues must be older than the times of Antenor and Peisistratos; and if *they* were older, there was another which seemed to be more recent than that period. This statue was not found in the hollow beside the Erechtheum with the others, but was obtained in excavations beside the Parthenon in a place where things had been hurled out of the way to make room when the Parthenon was being built,—so that it, also, was older than the building of the Parthenon and older than the Persian invasion. Probably it belonged to the period that intervened between the expulsion of the tyrants and the Persian invasion,—a short period during which the Athenians got their first true taste of freedom. In this figure, of which only little more than the bust had been recovered, the sculptor had become quite master of the fashion of his day, with its details of fine tresses, eyebrows, and lips. He had got beyond the spirit of the fashion; he aimed at something deeper, at some actual life behind the fashionable features, and he even went so far as to treat some of the details with a little neglect for the sake of letting the true life escape. He was, in fact, a forerunner of the nobler school that was to follow, and it was thus interesting to see the frigidity of the old times, pretty and attractive as it was, melting away ere yet the new sun had arisen. Among the inscribed pedestals found along with the statues on the Acropolis was one bearing the name of Onatas, a sculptor much praised in antiquity. We read often of him and of the Æginetan school, of which he was the chief ornament. We possessed a few of the metrical inscriptions which he, like some other sculptors of his time, used to place on the pedestals of his works. His verses might not be poetically ambitious, but it was worth remembering for a moment that the times must have been very simple and natural in the appreciation of art when the right thing for a sculptor to do was to write boldly across his pedestal a couple of verses telling his parentage and home, occasionally also mentioning some previous work that he had done. It had been the custom to assign to Onatas part at least of the statues obtained from a temple in Ægina, and now at Munich. From the style of these sculptures it was thought that they must belong to his time, and from the honour and esteem in which he was held in his native place it was argued that he would never have been passed over in so conspicuous a public work as was this temple. These, however, were mere probabilities, and it was, therefore, a matter of deep regret that no statue had yet been found on the Acropolis to fit on to the pedestal bearing the name of Onatas. It could not have been a much larger statue than those of which he had been speaking, and they were all, the lecturer thought, a little under life-size. It was a peculiarity of archaic sculptors to make their statues just under life size: they seemed afraid to face the actual reality of natural size, whether from some unconscious feeling that the imperfection of their manner might escape under an imperfect type of figure, or for other reasons. The sculptors of Ægina were no exception to that rule. From one of the two diagrams, representing Ægina statues, it would be seen that the female figure was not unlike the statue by Antenor in its general character; and if we had only these two statues to go by we could only say that Onatas was a little more advanced than Antenor, for no doubt the Ægina statue was the more advanced of the two. Onatas worked chiefly in bronze, and it so happened that along with the statues of the Acropolis there was found a bronze head which, from the point of view of archaic art, was unrivalled in its perfection. If this head were compared with the heads of the Ægina statues in Munich, it would be seen that there was a very considerable resemblance,—so much so, that one would be tempted to suppose the bronze head to be in reality that of the missing statue by Onatas, were one quite sure that the Ægina statues, or part of them, had actually been executed by him, as was generally supposed. Pausanias told us that Onatas was a contemporary of the Argive sculptor, Ageladas, the master from whom

Myron, Polykleitos, and Pheidias derived their excellence in technical matters. It would thus be seen that the excavations on the Acropolis had brought us into contact with some names famous in the early history of Greek art, and it was always a pleasure when a name hitherto only known from literary records was identified with an actually existing work of sculpture. He might mention another instance of that kind. Among the inscribed pedestals of statues was found part of one bearing the name of Archermos, a sculptor from the Island of Chios, one of a family of sculptors who, our literary records said, were the first to obtain distinction for sculpture in marble as opposed to those who, before their time, had been celebrated for work in bronze and other materials. The inscribed fragment did not tell as much, but in the Museum of Athens there was now a marble statue which was discovered a few years ago in the Island of Delos with its pedestal, on which were written the names of the two brothers Mikkiades and Archermos. From this statue, therefore, we were entitled to form a notion of the style and character of the missing statue by Archermos on the Acropolis. The statue from Delos, as would be seen by the diagram, represented a figure of Victory moving sidewards, but turned to the front, with her face and the upper part of her body. The workmanship was delicate and refined, but for the most part the delicacy and refinement were limited by formality and conventionalism, as might best be seen in the treatment of the hair with its fine formal curls. One of the most agreeable surprises that attended the excavations on the Acropolis happened just a year ago, when there was turned up a small bronze Athene (fig. 2). The figure was flat, like a relief; in fact, it was formed of two reliefs placed back to back, and showed us both sides of Athenè if we turned it round. But apart from this technical peculiarity this small bronze was a work of great beauty and charm. It was archaic, as everything found on that spot was bound to be, but the archaism was comparatively slight, and it might fairly be concluded that the figure had been made not long before the Persian destruction of the Acropolis. The effort of the Athenians of that time towards a large ideal style was shown by another example from the Acropolis,—a bronze head having a very striking resemblance in type and style to the head of Apollo from the west pediment of the Temple of Olympia(fig. 3). The sculptures at Olympia were older than the sculptures by Pheidias on the Parthenon: they were supposed to have been finished about midway between the Persian invasion and the sculptures of the Parthenon. But now we found among the ruins of the Acropolis, older than the Persian invasion, an example of the same large rough style, from which we might conclude that art had been making efforts towards its high ideal at an earlier period than had been supposed. In conclusion, Mr. Murray said he had mentioned the points which seemed of most importance in these sculptures, and if he might draw a practical lesson from them for the Academy students, it would be that a love of beauty and grace in the working-out of details, though it might not be the only way in which ultimate freedom and mastery were obtainable, was yet a safe and sure way to that end, provided no circumstances outside and irrespective of art came in to thwart and blight the life of the student.

Draycott Sewerage.—Mr. S. H. Terry, C.E., Local Government Board Inspector, held an inquiry at Draycott, on the 16th inst. to consider an application for a provisional order to empower the Shardlow Guardians to purchase compulsorily six acres of land belonging to Mr. John Tebbutt, and situate in the Sawley-lane. Mr. W. H. Radford, C.E., of Nottingham, explained that the land was required for sewage irrigation purposes, pointed out the necessity for a sewerage scheme, gave his reasons for recommending this site, and showed that unsuccessful efforts had been made to obtain the land by agreement. Most of the officials of the Shardlow Board, and the members of the Parochial Committee attended, and gave evidence in support of the application.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE seventh ordinary meeting of this Institute for the present session was held on Monday evening last, Mr. Alfred Waterhouse, President *ad interim*, in the chair.

"The Architects, Engineers, and Surveyors' Registration Bill."

The Chairman.—Before entering on the business, I have been asked by the Council to say a few words on the subject of what is called the Architects and Engineers' Bill of 1888. It is a Bill promoted by certain architects and others for the purpose of enrolling on a general register every architect, engineer, and surveyor in the United Kingdom. So far as the clauses of the proposed Bill are known to the Council, it cannot give the Bill its approval. You must not, however, suppose that the Institute is not considering the matter. It has a large and most influential committee, which, after repeated meetings, has, I believe, issued a report to the Council, though the Council has not yet been able to consider it. Meanwhile your Council is placing itself in communication with the other chartered bodies interested,—the Institution of Civil Engineers and the Surveyors' Institution,—with the view of opposing the Bill, which we cannot believe likely to promote the true interests of the profession (applause). The Institute expects that its future members shall have passed an examination showing their competency, and that is, after all, probably the best way of effecting the object proposed by the proposed Bill (renewed applause).

Mr. H. R. Gough.—Mr. Chairman, I hope you will pardon me for one moment, while I call attention to a misleading letter in the professional journals emanating from your Secretaries. That letter, Sir, implies to the general reader that it was sent out as purporting to come from the Institute. The memorial referred to in that letter, Sir, was sent out with two circulars under the heading of "King-street, Cheapside," and both signed by Mr. Edgar Farman. I mean to maintain that no member of the Institute is so ill-acquainted with what is going on in the profession as to suppose that the memorial emanated from this Institute. The petition was sent to members of this Institute only, and sent from King-street, Cheapside, with the signature of Mr. Edgar Farman, who is well known as the Secretary of the Committee promoting this Bill, regarding which I know many members of the Institute differ from me. On the other hand, I know that some 200 of your members fully agree with it, and have signed it. That is not to the purpose, however. I wish that men, whether they think differently about it or not, would fight honestly and strongly; but I ask, Sir, whether you think the "Note" in the *Builder*,—which, rightly or wrongly, is looked upon as the accredited organ of this society,—is right and proper; whether it is right that those promoting this Bill should not at least have the credit for integrity of purpose, and not be subjected to such annoyances as have occurred on more than one occasion through letters of your Secretaries and "Notes" in the *Builder*.

The Chairman.—You must excuse me, but we have nothing to do with what the *Builder* says.

Mr. Gough.—I was going to ask for an expression of opinion from the chair, as to whether the remarks they make are the fair outcome of Mr. White and Mr. Macvicar Anderson's circular.

The Chairman.—I have not seen them, and I must submit to the meeting that it is not competent to go into a question of that sort (applause).

Mr. Gough.—I will give notice, then, that a special meeting should be held to consider this matter. I shall send the proper requisition in.

A Voice.—That is *ultra vires*.

Mr. Charles Barry.—There is only one way of convening a special meeting.

Mr. Gough.—I confess I am unacquainted with the rules. A requisition has, I believe, to be signed by twelve Fellows, is it not so?

Mr. Barry.—By eight.

Mr. Octavius Hansard.—Mr. Chairman: I must object to a word which dropped from our friend before you ruled him out of order. He spoke of the *Builder* as the "accredited organ" of the Institute. I object to that. We have no paper, and we have no accredited organ of this Institute.*

Mr. Gough.—I am glad to hear that expression.

Mr. Langston.—Having written to the Secretary——

The Chairman.—I cannot allow this discussion to continue. I am sure the meeting generally will feel with me that we very often lose the point of the meeting by discussing a matter that was never intended to be discussed. I merely alluded to the question of the Act in the fewest possible words, to explain to the members that the Council was doing something, and I now must call upon Mr. Harvey to read his paper.

Masonry for Architectural Students.

Mr. Lawrence Harvey then read a paper on this subject. He said that his audience would doubtless agree with him that geometrical drawing was the language of architects, *i.e*, the means by which architects conveyed their ideas to others. He hoped to prove that the teaching of masonry was the most thorough and practical way of teaching geometrical drawing, and the only means by which geometrical drawing could truly become the living language of architects; that the science of masonry enriched the store of architectural ideas, thereby possessing a special artistic importance; and that it furnished ready, and sometimes indispensable, means of solving problems of construction in every branch of the building art. It was now admitted by mathematicians that the elementary notions of geometry were obtained through experience. Every one knew what a straight line was like, not from Euclid's definition, but because from childhood one was always seeing straight lines. Euclid's definition was only logical hair-splitting. Owing to this common-sense way of treating the definitions, and also to the consideration of the whole extent of lines and planes from infinity to infinity, instead of small parts, modern geometry, as taught by Professor Henrici at the City and Guilds' Central Institute, was to Euclid what the sewing-machine was to the needle. His teaching of masonry was likewise based on experience, his pupils being asked to believe only what they could see and touch. For instance, to explain the basis of geometrical drawing, he was not content to sketch in perspective the projection planes of the elevation and plan, but presented the projection planes themselves, in a model formed by two boards nailed together at right angles, one representing the elevation, the other the plan. By means of an object placed within the boards he showed how the elevation and plan of a point were determined, and that a point was only determined by its elevation and plan taken together; for each of the projections taken singly corresponded to an indefinite number of points. He then drew a horizontal line on the black board to represent the ground-line, impressing on his pupils to always remember that the ground-line was the line where the planes of elevation and plan met, and that every line or point drawn above the ground-line must be considered as being on a vertical plane, whereas every line or point drawn below the ground-line lay on a horizontal plane, as in the model. Mr. Harvey then described other demonstrations in connexion with the model by which his pupils learnt one of the principal methods of obtaining the moulds, or real shape, of any face of a stone belonging to a structure drawn in plan and elevation. This consisted in giving the stone a series of twists or rotations by which its faces were brought parallel to one of the projection planes. The next step was to learn how those rotations were drawn. Here it was only necessary to learn how to draw the rotations of one point, repeating the operation with every point in order to obtain the rotations of the whole of a solid. This also was taught by the use of the model, and completed his first lesson. In a similar manner he taught from the concrete facts themselves how the intersections of cones and cylinders were found, the various properties of the sections of the cone, and the methods of

* It is scarcely necessary for us to remark that we are in no sense "the accredited organ of the Institute." But we have felt bound, on public grounds, to defend the accredited representative body of the profession from what we regard as an organised attempt to dispute its supremacy. It will be remembered that Mr. Gough, and those allied with him, deliberately petitioned against the new Charter of the Institute.

finding the tangents. During the whole course his pupils were made to pass from the fact to its representation in drawing, and again from the drawing to the fact. After following Professor Henrici's lectures on modern geometry, the author was of opinion that there was no branch of mathematics as important, and especially so useful by its practical applications; but instead of advocating it as an introduction to masonry, which he had previously thought might be advisable, he seriously recommended lessons in masonry as the best preparation for entering intelligently on the study of modern geometry, the utility of which could not be too highly esteemed, and which might well be called, as the Professor named it, the royal road to mathematics. He considered that his statement that the science of masonry enriched the store of architectural ideas spoke for itself, as no architect would be found to deny it. Masonry comprised the whole range of vaulting, which was a very important section of architecture. Skew arches were not confined to modern times, and masons had at all times been highly exercised by that kind of arch; for if the beds were made to radiate from the axis, as usual, the thrust would not follow the direction of the wall, and it would find no abutment. This difficulty was now overcome by the invention of the spiral course. The ancient solution was not so effectual, but was ingenious, and, for other applications, worth knowing. The soffit of the arch was made cylindrical, but the arch stones were made to radiate from an axis perpendicular to the face of the wall and not from the centre line of the arch; the result being that the beds of the arch stones intersected the soffit of the arch along elliptical curves. The beds, however, were not always at right angles with the soffit, while the edges of the arch stones were sometimes sharp, sometimes obtuse, which was a great defect in masonry. To obviate this, the cow's horn skew arch was invented, in which the soffit was not a cylinder, but was generated by the motion of a line bound to meet the axis, from which the bed joints radiated, and the head curves of the arch on both sides of the wall. This was not so good a method as the modern spiral course, but had found a beautiful application in bridge architecture. In several bridges in Paris and its neighbourhood the arches began with a splayed surface and were built on the same principle. With the thin walls common to England there was not much opportunity of using back vaulting; but in the public buildings of Paris, with walls 3 ft. or 4 ft. thick, circular arches for doorways were usually finished inside by back vaulting. The most common was the Marseilles back vaulting, while the back vault of St. Anthony was little known even in France. Back vaultings were elegant architectural features, apart from their practical use, and in France were often used simply to connect harmoniously the circular head of an arch with the horizontal ceiling of a room or hall. Turrets were generally carried on stones corbelled out, but could be carried by an arch called by French masons "trompe" (a corruption probably of "triomphe"). The arch which carried the circular apse forming the Lady Chapel at the back of the Church of St. Sulpice, Paris, was an example of this kind of arch. In the plan of St. Paul's, London, the ceiling was divided into oblong spaces, yet these spaces were covered by flat domes and pendentives. That the pendentives were spherical surfaces everyone could see, but many might not realise how the vaulting was designed. The author believed it was as follows:—Through the angles of the oblong space to be covered by the vault a sphere was made to pass; of this sphere only the surface comprised between the cross-ribs and the walls of the nave remained. This spherical surface was then cut above by a horizontal plane from which the flat cupola sprang, and on the two sides it was penetrated by elliptical lunettes. Having explained a method for producing pendentives between four pointed arches, Mr. Harvey cited two cases within his knowledge where masonry had helped constructors out of considerable difficulty. One referred to stone work, and the second to carpentry. In most architectural schools on the Continent masonry was taught theoretically, but the practical cutting of stones and construction of models were not much encouraged, owing, obviously, to the enormous trouble the practice of stone-cutting gave to the teacher. Having explained the course he adopted in his class in the preparation of the necessary drawings and moulds, the author concluded with the hope that they would do better than could be done abroad. The work he was at present doing would remain for future teachers; his drawings and moulds could be repeated *ad infinitum*; and with their aid masonry could be taught practically as well as theoretically all over the country. The science of masonry contained the grammar and syntax of geometrical drawing, and he considered its study must form the foundation of the architect's technical education.

Mr. Henry Dawson proposed a vote of thanks to Mr. Harvey for the very careful manner in which he had treated the subject. He only hoped he had misunderstood Mr. Harvey on one point, viz., that he meant to say that the study of Euclid was an effete science. The defect in past years in the schools had been that Euclid was studied as a theoretical science, without the practical application of it by the study of geometry, and that of masonry necessarily arising out of it. A careful study of the first few books of Euclid would enable the student much better to apply the propositions when he came to the study of geometry. He quite believed that much of the time of the young student was wasted in trying to master some of the magnificent problems of the first book of Euclid, but if the study of geometry was combined with it, there would be fewer failures at the *pons asinorum*. It was too much the fashion at the present day to think that all the old fogies were fools, and that only the young men were wise.

Mr. Charles Barry seconded the vote of thanks, and ventured to join in the hope that the study of practical masonry would form an important part hereafter of the examination for Associates of the Institute. He also hoped that the City and Guilds of London Institute, who had encouraged Mr. Harvey by giving him rooms at their Central Institute, would further see their way to make so useful a branch of technical instruction very much more important than it was at present.

Mr. Shopland, as Secretary of the Class of Practical Masonry, said that Mr. Harvey's method of teaching was the only one he had found of practical use to masons.

Mr. Stannus, speaking on behalf of the younger men, bore testimony to Mr. Harvey's admirable method of teaching. The charge against architects was that too many of them were purely theoretical, but Mr. Harvey showed them how practical knowledge might be acquired.

Mr. Arthur Cates said that although Mr. Harvey had spoken of himself as an enthusiast, he ought to be termed a self-sacrificing enthusiast, because he had given up so much of his time to the work, while the only reward that could be looked for was in the future. He could only trust that the architects of the metropolis would show their appreciation of the importance of the knowledge Mr. Harvey was so well able to impart, by encouraging their pupils to attend his course of instruction.

The Chairman desired to know the length of the course of lectures, and only wished it was in his power to become one of Mr. Harvey's pupils.

The vote of thanks was then put and carried.

Mr. Harvey replied, and added that his course of instruction consisted of three series of ten lessons, which only covered half the subject. In Paris there was a school for masons established by the municipality, where each pupil made his own drawings, and cut out his own material. Such a course, however, extended over five years, with two lessons weekly, or about 1,000 lessons in all. By his arrangement of being foreman himself, and making the drawings, he believed he could do in sixty lessons as much as was done in Paris. The sixty lessons would represent two per week for a year, and such a course would make the pupil not only a thorough master of the subject, but also of being able to work anything in architecture. In reply to Mr. Dawson, he would say that Euclid was a dead and gone geometry. There was no doctrine at the bottom of Euclid, which was in reality merely a series of "dodges." The modern geometry, on the other hand, gave everything that Euclid did, and went far beyond. Modern geometry treated of the proportions of lines and planes from infinity to infinity, and when once those proportions were fixed in the mind of the student, instead of knowing a series of "dodges," all the problems of Euclid were simply truisms to him.

The Chairman intimated that the next meeting would take place on the 5th prox., when the preliminary report on the new By-laws would be under consideration.

DRY ROT.*

The subject of my paper as announced in the Brown Book is "A Botanical Contribution to Architecture." This is a vague title and encloses a wide field. My particular subject, however, is "Dry Rot," as the diagrams on the screen will probably have revealed. I must, however, narrow the limits of my subject still further, for "dry rot" is frequently induced in different woods by different species of fungi, and even the timber of the coniferæ may be attacked by different species, although their effect on the wood is practically the same. I propose, then, to consider only the commonest, most destructive, and best known of the dry-rot fungi, *Merulius lachrymans*, its life-history, and its effect on pine wood.

Whereas most fungi are to be found in the damp surroundings of the forest, *Merulius*, being of a more genteel nature, prefers the wrought timber-work of a house, and has rarely, if ever, been found in a wild state.

When commencing to grow this fungus last autumn, with the object of observing its habits and testing the susceptibility of wood of various degrees of seasoning to its attacks, I found I could obtain very little satisfactory information on the subject from books or pamphlets, but within the last few weeks a series of excellent articles has appeared in *Nature* on the "Diseases of Timber," from the pen of Mr. Marshall Ward, and I wish to express at the outset my indebtedness to them. I learn from Mr. Ward that they are to be extended and published in a book form by Messrs. Macmillan & Co. within a short time, and I believe the work will prove invaluable to architects as a book of reference.

We cannot study the diseased state of an organ intelligently without knowing its healthy state, and it will be necessary, therefore, to consider the structure of sound pine wood, and, to some extent, the physiological functions of its parts, before discussing the diseased state induced by *Merulius*.

Let us suppose we have the opportunity of examining a piece of pine trunk. We shall observe:—I. The central axis of pith composed of loosely-packed thin-walled cells, and surrounded by groups of tubular vessels having spirally thickened walls, forming more or less of a cylinder, called the *medullary sheath*. II. Outside this comes the great mass of the wood, which is marked on the transverse section by two systems of lines, the concentric lines showing the *annual rings* and the radial lines the *medullary rays*. Both produce lines of weakness, and frequently give rise to cracks,—"cup-shakes" resulting from the former, "star-shakes" from the latter. All the medullary rays appear to start from the periphery of the wood,—some extending right through to the pith and others to various distances. Amongst the wood it will also be noticed that here and there the cells have separated so as to form *resin passages*. III. Outside the wood, and separated from it by the series of wet succulent cells of the *cambium*, comes the bark. This in its inner portion is traversed by medullary rays, and includes the *sieve-tubes*, which are long tubular cells, the one separated from that below by a perforated plate or sieve. The outer portion includes more spherical-shaped cells containing nutrient substances. Here and there is to be seen a large resin passage.

The whole is invested with layers of impervious cork, which keeps the tree from the weather.

If then we examine from the pith outwards, we shall pass ring after ring of annual growth, and while we shall not lose the old, we shall continually find new medullary rays starting. As we get near the margin of the wood its cells will become more delicate, until we arrive at that line of succulent cells which separates the wood from the bark, the line of weakness through which the bark tears off. These cells form the *cambium* or growing issue of the tree; they are delicate thin-walled, filled with granular protoplasm, bathed with fluid, and divided tangentially, giving rise to new wood

* A paper on Dry Rot (*Merulius lachrymans*), by Mr. W. H. Bidlake, M.A., read before the Architectural Association on the 17th inst.

cells on the one hand and, to a much less extent, new bark cells on the other.

I have used the term "protoplasm." By it is understood that transparent, semi-fluid, glairy substance which is always present in living cells, whether animal or vegetable, and which has been called the "physical basis of life." For life apart from it is unknown, and by it all tissues, howsoever differentiated, have been formed. It is a highly complex substance, and consists chemically of carbon, hydrogen, oxygen, nitrogen, sulphur, and perhaps a little phosphorus. When newly formed from the cambium the wood cells contain protoplasm and nutrient substances, and their walls, which are thin, are composed of cellulose. The protoplasm employs itself with thickening the cell wall by adding layers of cellulose, in which process not only are the nutrient substances used up, but the protoplasm is itself eventually absorbed.

material is laid during summer, when the leaves are active, to be used the next spring.

It will now be necessary to glance at the structure of the root, or, rather, one of the rootlets (Fig. 3 is a section through a rootlet; Fig. 4 shows its end, with hairs; and Fig. 5 shows a root-hair in contact with particles of soil). Here the central axis is formed by the woody vessels, and is surrounded by tissue somewhat resembling pith in its structure, whose cells are lined with protoplasm and have cellulose walls. The whole is invested by a membrane, one cell thick,—the *epidermis*. Many of these epidermis cells grow out into long closed tubes, called *root hairs*, so that the end of a rootlet resembles in appearance a diminutive brush, such as is used for cleaning glass tubes. These root hairs are in most intimate contact with the particles of soil, and absorb water from the thin film with which the particles are coated,—not the water which fills

woody vessels in the centre of the rootlet. The total sum of the pressures exerted by all the rootlets is called "*root-pressure*," and may be so great that water is forced up the trunk of the tree to a considerable height.

Turning now to the leaves, we shall find that their constituent cells are kept tense with water, which, however, they are continually losing by evaporation through the "breathing" pores or "*stomata*." But while they are losing water by evaporation, they are at the same time, in virtue of their osmotic properties, taking it from the neighbouring cells, and these in turn are taking it from others, and so on, till at length the vessels are reached and their water drawn from them. The whole process is called "Transpiration."

Here, then, we have the roots forcing up water from below, and the leaves drawing up water from above. By what channel does it flow? It flows in the outer rings of the wood,

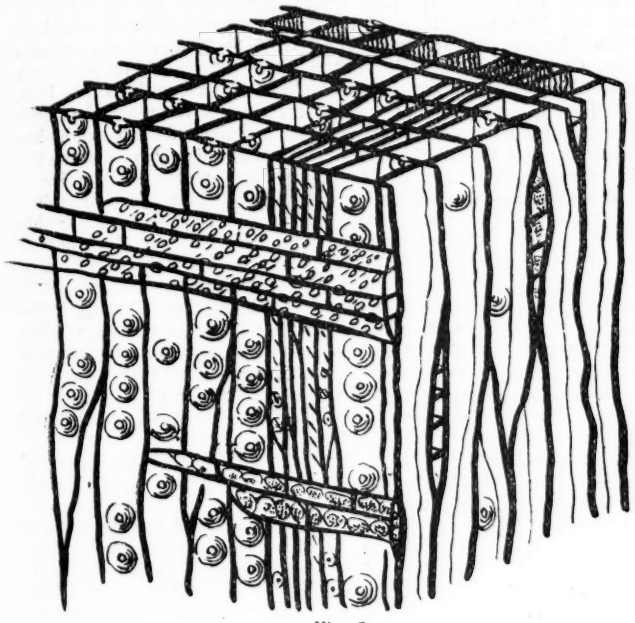


Fig. 1.

Fig. 2.

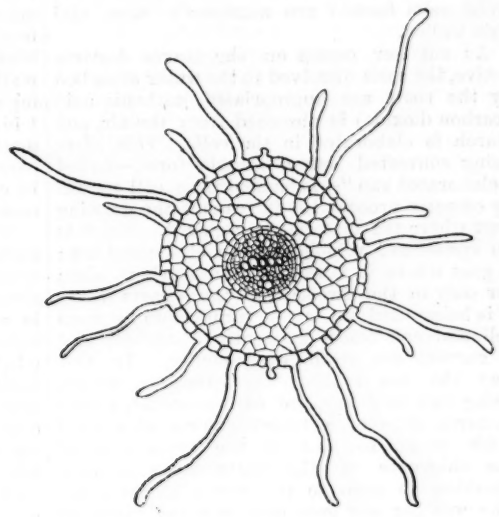


Fig. 3.

This thickening does not take place regularly over the whole of the cell, for, chiefly on its radial walls, rows of circular areas remain thin, and the cell wall is prolonged inwards from their margins so as to surround the depression thus formed. As an exactly similar operation is in process at the same spot in the next cell, a structure results which one may compare to two thick watch-glasses, each pierced by a hole in the centre, placed face to face, and the thin persistent membrane between adhering to the inner surface of one of the glasses. The whole structure is called a "bordered pit," and when seen in front elevation, it presents the appearance of two concentric circles. (See Figs. 1 and 2.) It plays an important part in the diffusion of water.

When the operation of thickening the cell wall is complete, and the cell contents used up, an important change takes place: the cellulose becomes converted into lignin. This is not a definite chemical compound, but includes several substances, of which lignose is an important one. The cell walls are now said to be lignified; they now form true wood. This change renders them harder, more elastic, less absorbent, but at the same time easily traversed by water. The centre line between one thickened cell wall and another undergoes a still further change, and is called the "middle lamella."

We must think of pine wood, then, as made up of long tubular cells (see Fig. 1), nearly square on plan, with bluntly tapering ends, whose radial walls are studded with bordered pits. Such cells are called "*tracheïdes*."

Those *tracheïdes*, which form the darker-coloured and more compact wood of the annual ring, have very short thick radial walls, which have small pits, or are simply striated. The tangential walls are thus brought very close together.

The medullary rays have cells disposed like the stretching courses of very long bricks, and from one to six courses deep, and are lenticular in cross section. The cells of some rays have pits, and spiral markings, others are plain. These latter are storage cells, and in them food

the interstices of the soil. This absorption of water through the cell wall is induced by the presence of organic acids within the cell, and is so great that not only does the cell become distended with water, but it often takes up more than it can hold, so that the water exudes again. This is called the *osmotic* property of cells, and is of immense importance to

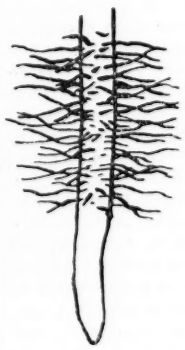


Fig. 4.

Fig. 5.

plant life: in fact, plant life may be said to be dependent upon it. The cells contiguous to the root hairs now absorb the water from them in the same way as and from the same cause that they had absorbed it from the soil. Water is thus passed on from cell to cell until all the cells become distended with it, and at length the hydrostatic pressure becomes so great that the water is filtered through the walls into the

which are in consequence called "sap wood," or alburnum. Yet if the trunk be cut across at any time, except at certain times, especially in the spring, the vessels will be found to be

Fig. 6.

empty, and that notwithstanding the fact that the leaves may have been at the time most actively transpiring. The fact is, the water passes upward in the substance of the lignified cell walls of the sap wood. (It has already been

remarked that lignin is very readily traversed by water.) I made a reservation a short time ago: I said that the wood vessels were empty *except in spring*. Now, in spring the ground soon gets warmed as the sun gains power, and, in consequence, the roots get stirred to activity, and water is filtered into and forced up the vessels. The new leaves are, however, not yet formed, and the old ones not fully awake, and so there is little or no transpiration. The water is forced up by root-pressure alone, and fills the cavities of the vessels. The sap is now said to be rising, and if the tree be cut, water exudes from the lower portion in connexion with the roots, and it is said to "bleed." Spring is in consequence the worst time for felling trees. This, however, is not all, for the ascent of the warmed water in the wood cells near the cambium awakens those of the later into activity. They begin to divide and form wood cells; but as the stock of nutrient material stored up in the medullary rays is but scant, and the leaves have not yet begun to send down their contributions, the wood cells formed are necessarily large and thin walled.

As summer comes on the leaves become active, the salts dissolved in the water absorbed by the roots are appropriated, carbonic acid (carbon dioxide) is absorbed from the air, and starch is elaborated in the cells. This, after being converted into a soluble form,—called "elaborated sap"—is handed from cell to cell by osmotic process till it reaches the growing part where the material is required. There is no specialised vehicle for the elaborated sap; it goes where it is wanted, and nowhere else; for only in the direction of those parts where it is being used up is the equilibrium between cell and cell being constantly disturbed, and a current set up in consequence. In this way the sap reaches the cambium, which, being now well supplied with material, manufactures cells of a better quality with good thick walls, so that in the autumn wood the thickness of the walls bears a very considerable ratio to the cavity of the cells. The weather now gets cold, and the cambium becomes dormant until it is awakened in the spring to again manufacture large cells with insufficient material. There is thus a sudden transition from the dense autumn wood to the porous spring wood, and thus gives rise to the appearance of the annual rings. This intermittent food supply is, however, not the only cause of the difference between autumn and spring wood, for toward the autumn a very considerable transverse tension is set up owing to the increase in the diameter of the trunk by the activity of the cambium, and this finds expression in the small compact cells that are then formed, as also in the peripherally-stretched cells of the cortex. During winter the cortical tissue becomes dry and cracks, so that in spring the transverse tension is relieved and the new cells are large.

Having now considered the structure and growth of the timber, let us suppose it felled, shipped, stacked, sawn up, and built into a floor, being quite sound and having escaped the attacks of various fungi and other mischances.

We may, perhaps, now consider it secure. No! A fungus, not of wild forest life, but of domesticated habits, attacks it. *Merulius lachrymans* steals upon it in the dark stagnant air and dooms it to rottenness and decay.

Let us suppose that a single spore of about 1-3,000th of an inch in diameter has found its way to the under-surface of one of the joists, either by this having previously been placed near infected wood, or from being cut by a saw which had been used upon infected wood, or, perhaps, the spore had floated thither in the air. What will happen? That depends largely on the architect and builder. Every organism to live and thrive must have a congenial environment, and the *Merulius* spore requires darkness and a warm damp stagnant air.

This is not, however, sufficient. For a long time the spores could not be induced to germinate artificially until it was discovered a few years ago by Professor Hartig (to whom much of our knowledge of *Merulius* is due) that the presence of an alkali, such as ammonia, is a necessary condition. This frequently rises from the soil when it has not been properly prepared and from bad mortar or defective drains.

The spore lodged on the damp timber now begins to germinate. One or more protuberances appear on its surface, and these elongate into minute closed tubes or *hyphæ*, the spore meantime becoming exhausted of its contents. From the tips of the hyphæ a solvent is secreted which attacks the lignin and enables the filaments to pierce the cell wall and enter the wood, which soon exhibits a greenish grey soft patch. The hyphæ now divide and ramify, attacking first the nutrient substances stored in the cells of the medullary rays, whence they obtain the nitrogen, potassium and phosphorus necessary for their more vigorous growth. Here and there a white mould breaks out from the joist in rounded patches, looking like white swan's-down or cotton wool, but whose filaments seem to radiate from a number of centres on the surface of the wood. This outgrowth becomes more compact till it forms a dense felt of interwoven hyphæ of a slate or brown colour, which creeps along the surface of the joists and completely encases them, while thick strands of it run in the angles between the boarding and the joists or hang in festoons from one joist to another. In a very bad case which I inspected last November at Tipton Parish Church, in Staffordshire, the joists presented a most remarkable appearance, in all directions appearing as if padded with white cotton wool about 1 in. deep, with strands of the same hanging as pendants or in festoons. This is the vegetative part of the fungus and is called the *mycelium*. It corresponds to the "spawn" of the mushroom.

Where this outgrowth is taking place on the surface of the wood, the delicate filaments, or hyphæ, are piercing the cell walls, extending along the tracheïdes, and permeating the wood in all directions (see fig. 6). The mineral substances are appropriated, and the lignose ($C_{18}H_{26}O_{11}$) of the cell walls, which is more complex in its chemical constitution, and which contains a larger amount of carbon relatively to oxygen than cellulose ($C_6H_{10}O_5$), is converted again into cellulose, which absorbs water and swells up, and then is itself absorbed or broken up into simpler substances by the fungus. The middle lamella of the cells is, moreover, dissolved, and the cells become dissociated.

Outward signs betray the havoc that is going on within. The wood at first becomes discoloured, having a dull sepia hue, with here and there a streak of brown and pink colour. It then swells, as the cell walls become converted into cellulose and absorb water; then shrinks as the cellulose is further broken up, and water is absorbed by the fungus or evaporates from the surface, so that long fissures arise, first in the direction of the wood fibres, and then across them, and the wood presents the appearance of having been charred. It also becomes much lighter, gives a dead sound when tapped, and, if damp, is quite soft, and can easily be pierced by a penkife; or, if dry, crumbles away to a light brown powder: moreover, the air in the vicinity has an unpleasant musky smell. It is needless to say that the wood loses all its strength, and may sometimes give rise to sudden and serious accidents. I heard of a case that occurred in Brook-street, where the occupants of a room were disagreeably surprised to find the floor falling in.

It will be seen how necessary moisture is to the well-being of the fungus by the fact that half its weight consists of water. Indeed, so susceptible is it to drought that it soon withers in dry air, and the delicate growth on an infected chip withered after an exposure of a few minutes. The mycelium condenses moisture from the air, and the wood when in a decayed state readily condenses and absorbs it. It is taken up by the hyphæ by virtue of their osmotic action, which is usually so great as to cause water to exude again from the mycelium in minute drops. The mycelium may extend over brickwork, and absorb moisture from it, it may even penetrate the soil and transport moisture to parts growing in dry situations.

At Tipton Church a bench-end was completely rotten, although the air in the church was comparatively dry, and there was no outward sign of fungus, yet the substance of the wood was evidently permeated by hyphæ, for I broke a piece off, and, having placed it in favourable conditions, found it soon develop an external mycelial growth. It seems probable that these hyphæ were continuous with and obtained moisture from those beneath the floor. Paint may thus secure the exterior of timber, but does not necessarily insure immunity from disease of the interior. Nay, it may even render it more susceptible if the wood was not previously dry and well seasoned, for it imprisons the moisture. I have a piece of grained and varnished skirting which, except for being a little warped, appears quite sound in front, yet the whole of the back has been destroyed by dry-rot fungus allied to that which we are considering (*Polyporus vaporarius*, which causes the red decayed patches in deal called "red rot").

I said that nitrogenous substances formed a necessary part of the food of the fungus (for nitrogen is one of the constituent elements of protoplasm), and that the only important source of such was the medullary rays. Now, it has been observed that the fungus economises these by passing the protoplasmic contents of the older hyphæ on to the younger growing ones.

By virtue of these habits, viz., of drawing moisture from a distance and passing on the cell contents, the fungus can creep across brickwork and attack fresh wood.

We saw, when considering the structure of pine, that the newer wood cells still contained some protoplasm and nutrient matter, and also that the outer rings of wood or alburnum formed the vehicle of the ascending sap. It is, evident, tnerefore, that if a builder has used this green wood, or unseasoned sapwood, he has provided the very substance to encourage the most rapid and vigorous growth of *Merulius*.

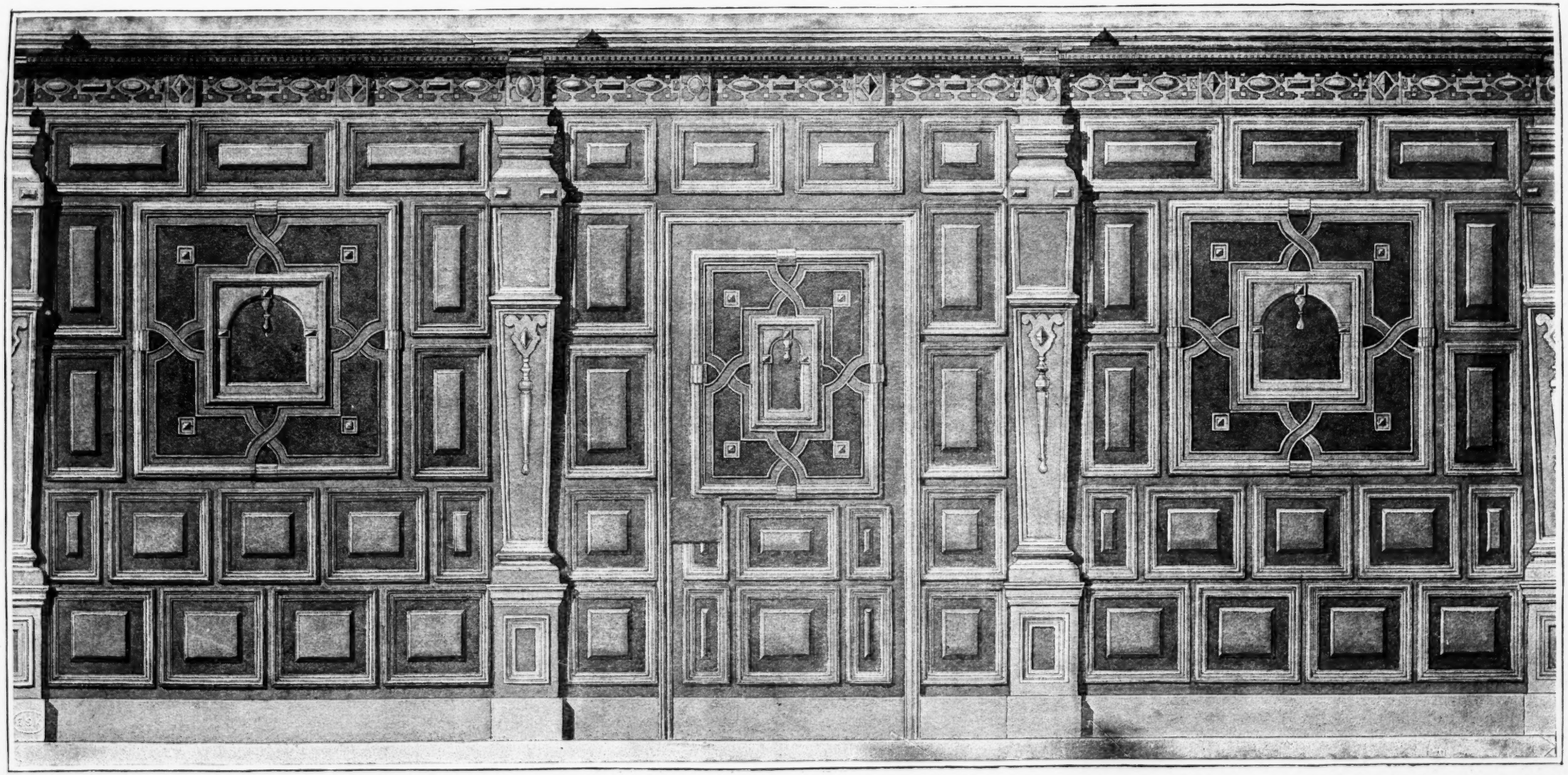
Under favourable conditions the dense felted *mycelium* which extends along the under side of the timber assumes a more definite outline and along its margins, which often curve slightly downwards, the surface becomes pitted and corrugated, resembling that of spongy india-rubber, but with the walls of the depressions zigzag and serrated. It now assumes a warm brown colour, and from it are distilled, in consequence of the osmotic activity of its cells, clear drops of water, so that it glistens as if covered with dew.

This is the fructification of the fungus and the pendent tears have given it its specific name.

Merulius lachrymans is allied to the mushroom (as shown in the table, which gives several of the orders of fungi, with their best-known representatives), the *mycelium* corresponds with the mushroom "spawn" and the fructification with the mushroom itself, the zigzag corrugated ridges being the analogues of the mushroom "gills."

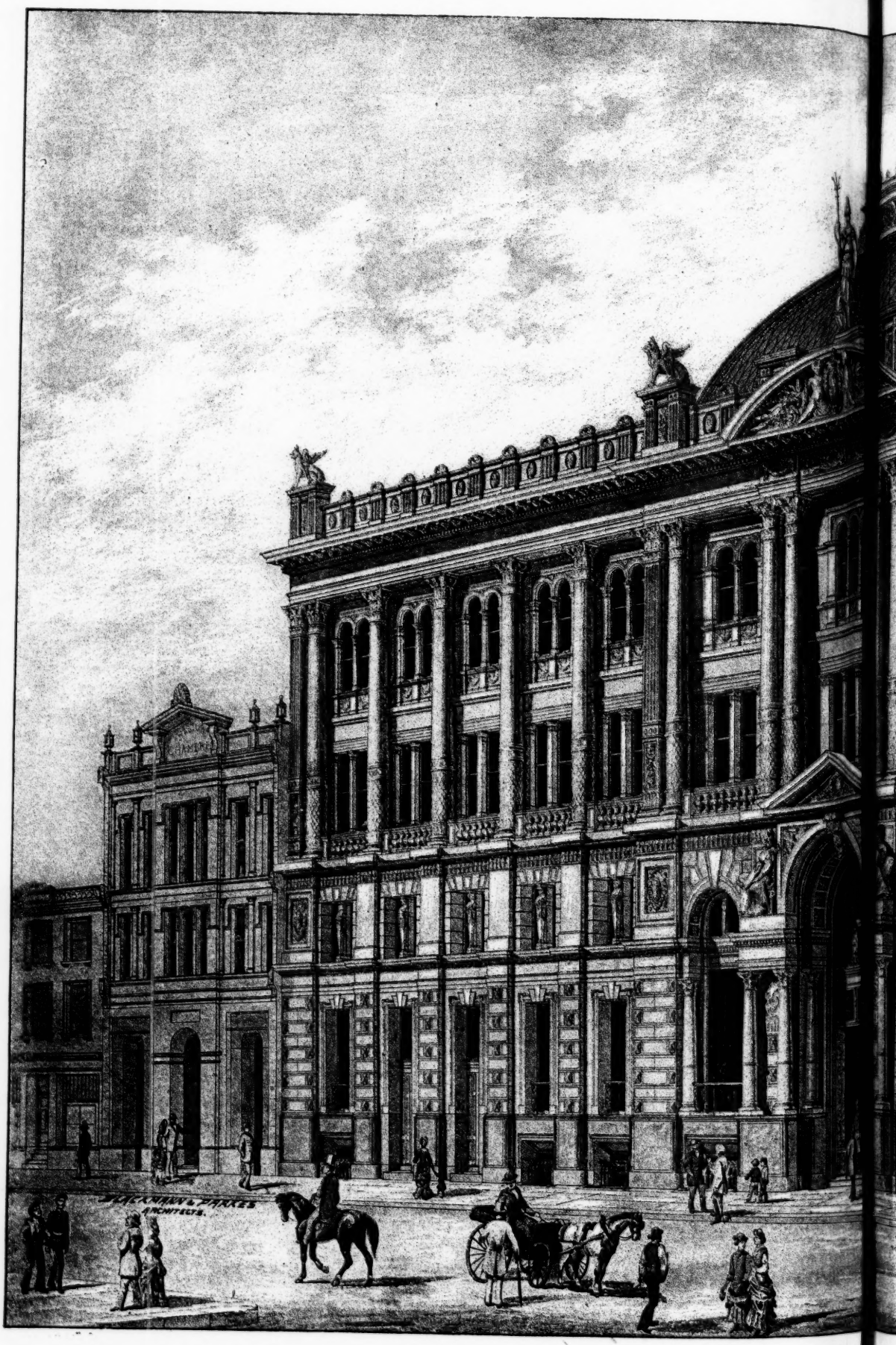
Let us now examine the fructification of *Merulius* more in detail.

The upper surface next the beam is of a stiff corky nature, and composed of interwoven thick walled hyphæ. These in their downward course become more delicate in texture, and are grouped together in bundles (*trama*) forming the irregularities of surface, which we have observed; the cells at the same time become shorter and more spherical, so as to form a more or less distinct limiting layer, the *sub-hymenial layer* which follows all the irregularities of contour. Over this layer numbers of elongated cells, closely packed together, are arranged like velvet pile. These cells are called *basidia*, and in the young state have a simple club-shaped outline. Soon, however, from the top of each *basidium* four little horns grow out, which in time develope little knobs at their extremities. Each little knob increases in size, invests itself with a brown-coloured cell wall, and presents the appearance of a full-grown spore supported on a very delicate stalk (*sterigma*). Each *basidium*, then, produces four spores, borne at the tips of very delicate stalks, and in so doing exhausts itself of the granular protoplasmic substances with which it was at first filled. The spores when ripe are so delicately attached that they easily drop off. Some of the cells of this outer layer (the *hymenium*), however, take a somewhat different shape; they are sterile, and do not produce spores. They are called *paraphyses*. The meaning of the honeycombed surface of the fructification is now evident: it is to increase the spore-bearing surface. This I conclude, from a very rough calculation, it does about six times. Now, a spore is slightly larger than the red corpuscle of blood, and as this is about 1-3,500th of an inch in diameter, we may suppose each spore is about 1-3,000th of an inch. Nearly ten million spores could therefore be placed within the area of a square inch. If we suppose that on the fructification the spores are placed so far apart that there are only four millions to the square inch, and suppose further that the fructification occupies 12 square inches,

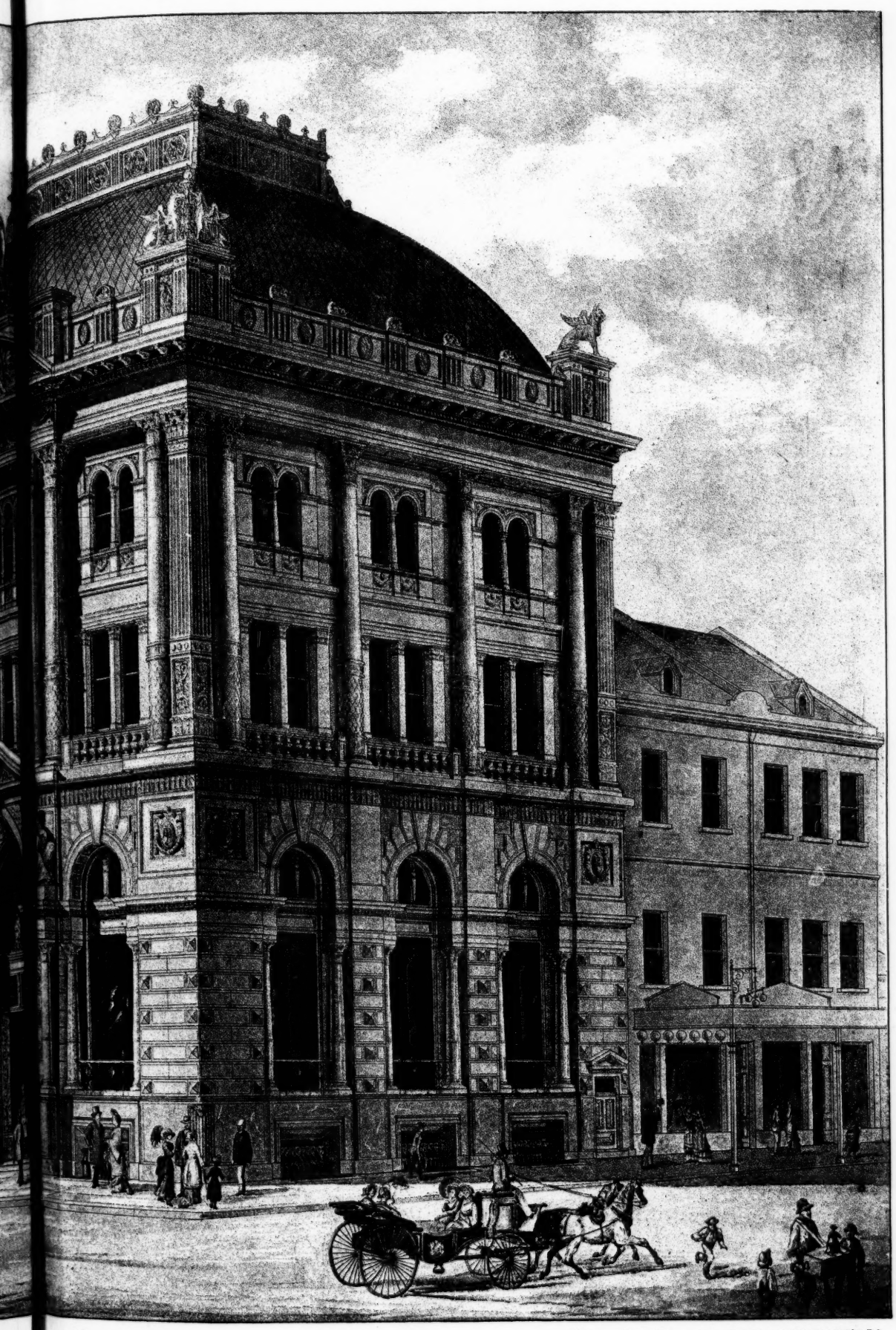


The Phototype Co., 303, Strand, London.

LIBRARY, BENTHALL HALL. WAINSCOT. Drawn by Mr B. J. FLETCHER.



THE AUSTRALIAN JOINT STOCK BANK BUILDINGS, SYDNEY



"INK-PHOTO," SPRAGUE & Co. 22, MARTINS LANE, CANNON ST, LONDON, E.C.

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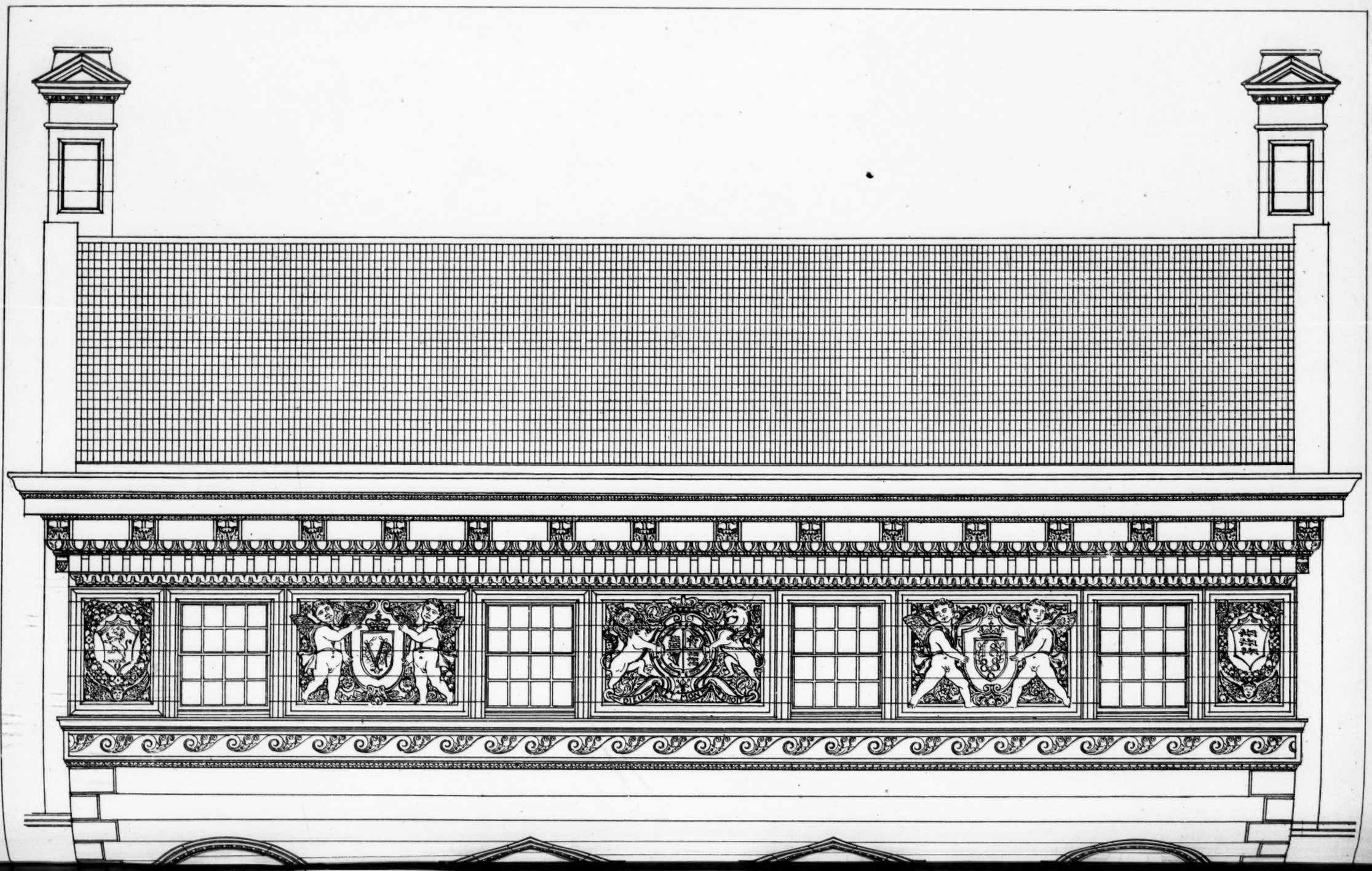
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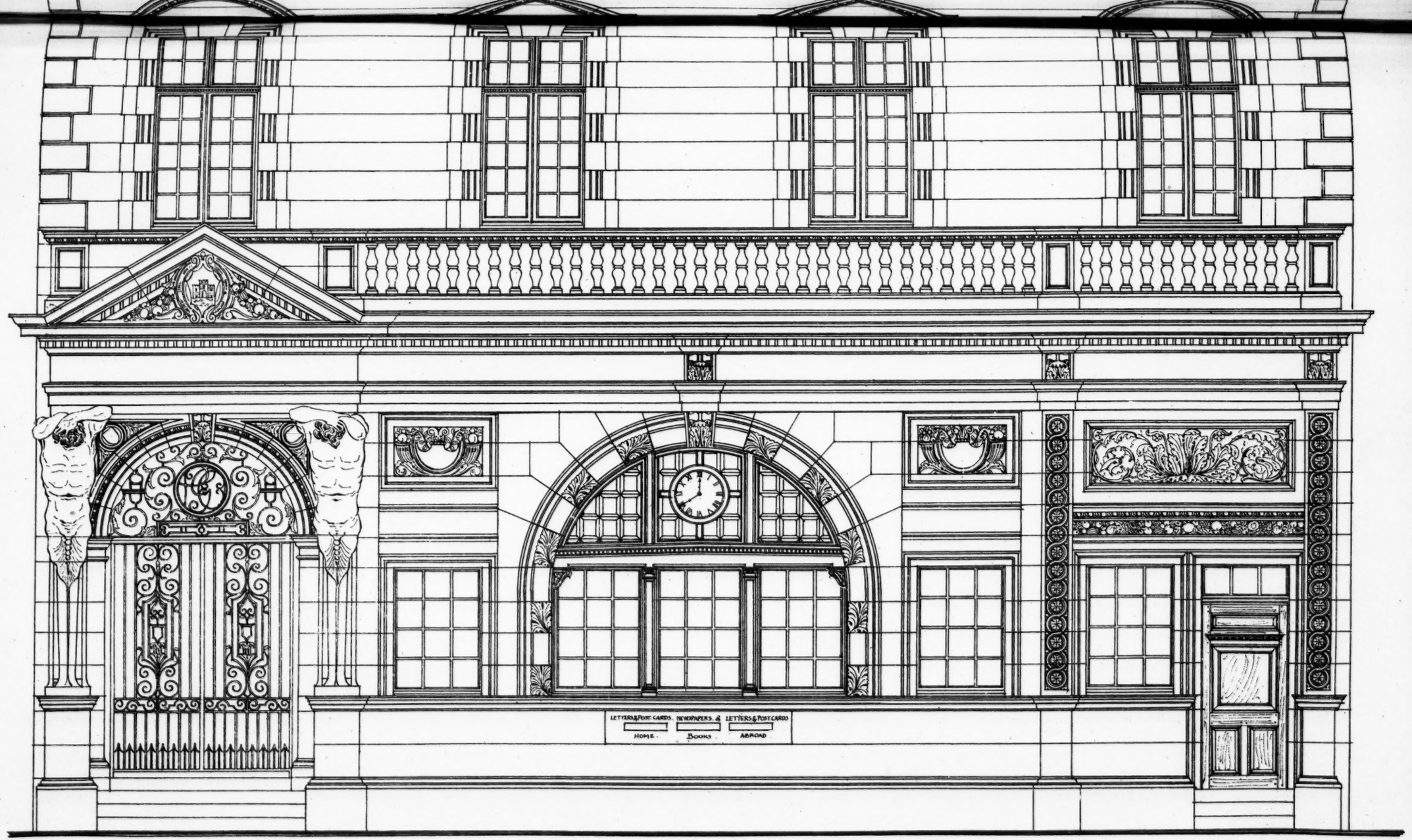


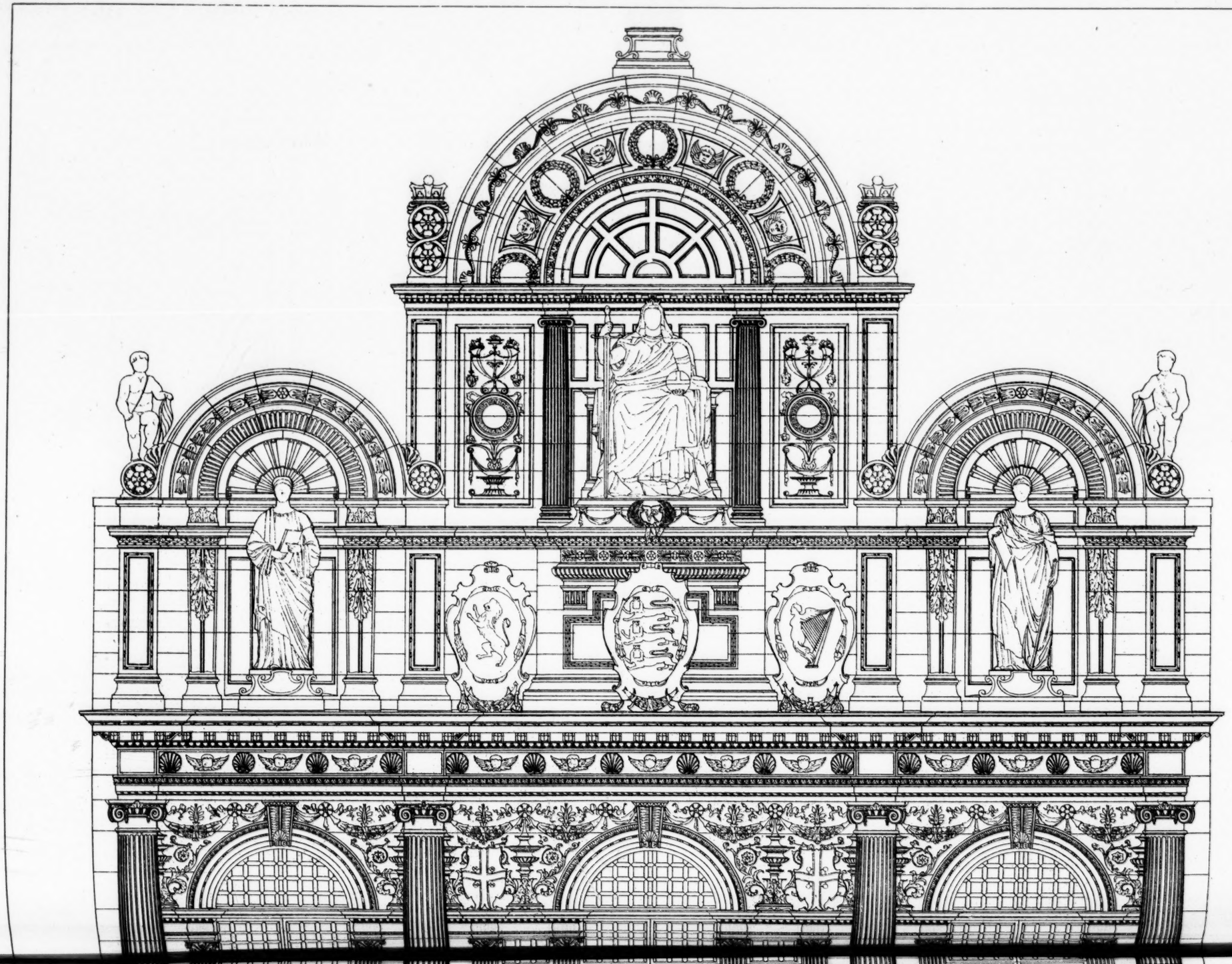
Half inch Detail.

Scale of ft. & 0. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. Feet.

PHOTO-LITHO, SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

Tite Prize Competition, 1888.

A DESIGN FOR A POST OFFICE: By Mr. R. Watson.



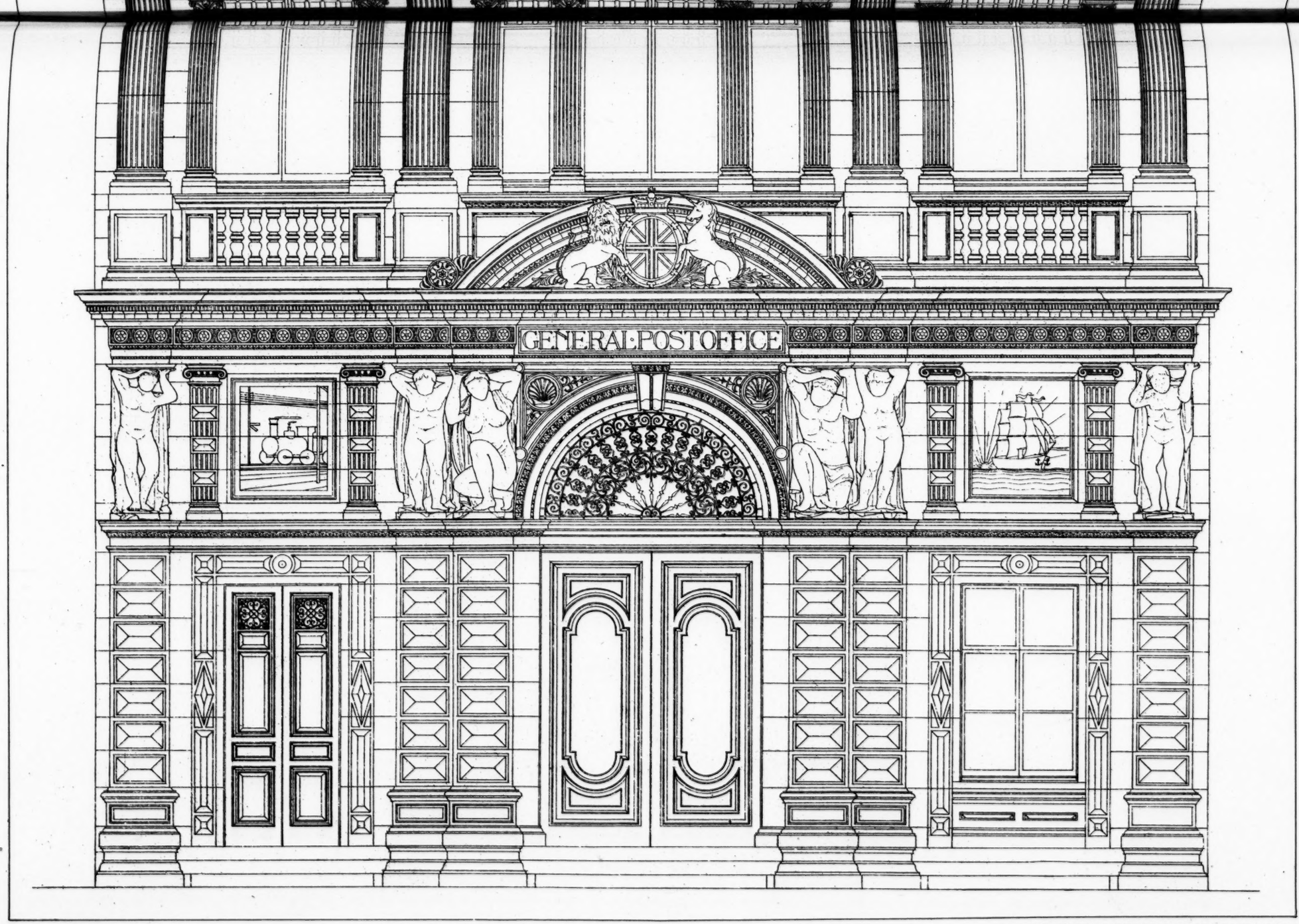
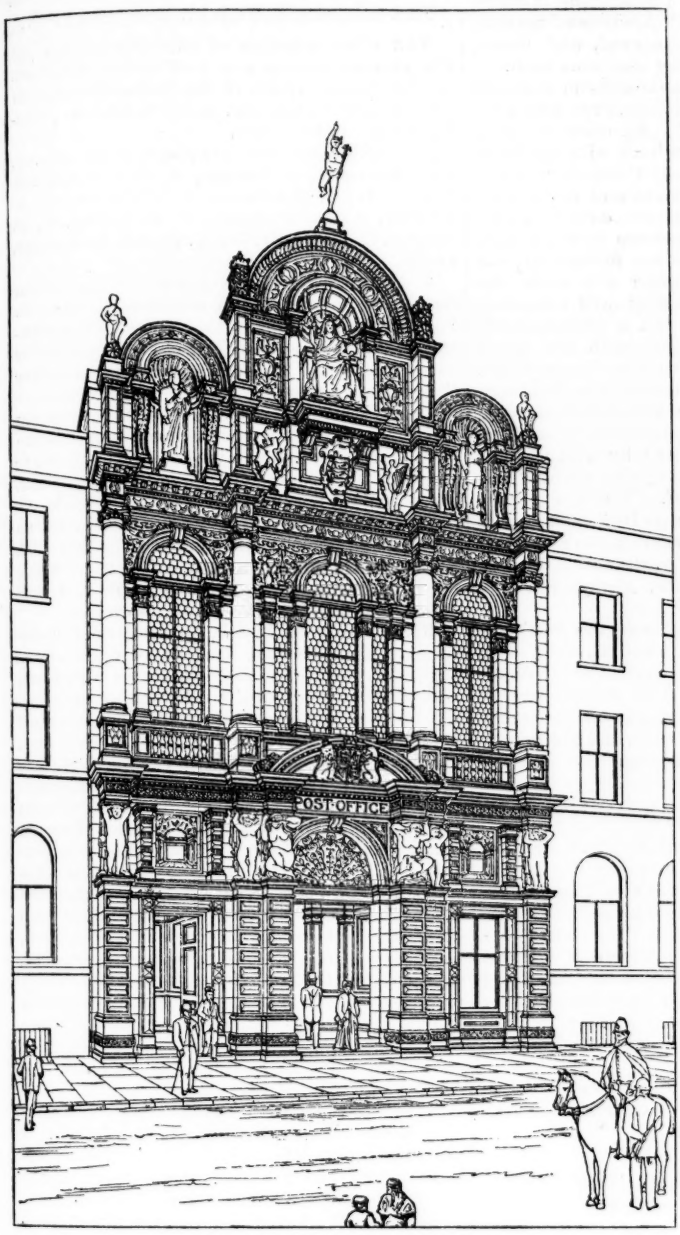


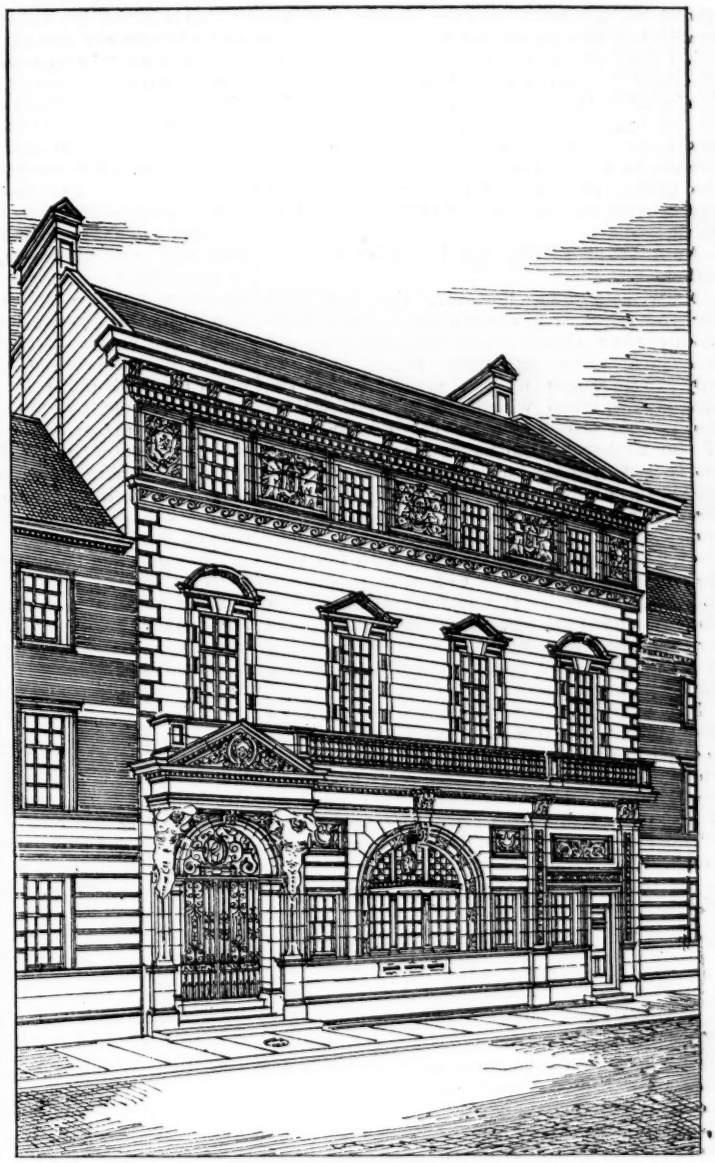
PHOTO-LITHO, SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

Awarded a Medal of Merit, Tite Prize Competition, 1888.

A DESIGN FOR A POST OFFICE: By Mr. J. J. Pearson.



DESIGN BY MR. J. J. PEARSON.



DESIGN BY MR. R. WATSON.

Perspective Views of Two Designs for a Post-Office, submitted in Competition for the "Tite Prize" of the Institute of Architects.

which, multiplied by 6 to allow for the honeycombed surface, gives an area of 72 square inches, we should find as a result of our calculations, that two hundred and eight-eight millions (288,000,000) of spores would be produced by a single fructification, and in a bad case of dry-rot there may be many such.

Having now traced the life history of the fungus I should like before closing to make a few practical deductions.

First, with regard to the state of timber used in building. A tree should not be felled before it has arrived at maturity, for it has too large a proportion of sap wood to heart wood, and the season for felling should be that during which the growing and cell-dividing process is dormant, and there is no sap rising through wood cells.

Vitruvius says that felling should take place from early autumn to end of winter, and adds that the tree should be cut to the pith so as to allow the escape of the sap. By Statute of James I. people were prevented from felling trees from April 1st to June 30th, and in France a royal decree in 1669 prescribed the time for felling to be October 1st to April 15th. Napoleon I. also, in an order issued to Commissioners of Forests, directed that naval timber should only be felled from November 1st to March 15th.

The wood should afterwards be cut up and slowly but thoroughly seasoned. This is effected by completely immersing in water, steaming or boiling, by which the protoplasmic and nutrient substances are dissolved from the cells. It must then be stacked on end in a well-ventilated shed, whose floor is composed of ashes or concrete. Irregular or too rapid drying, or direct sun warmth, causes the wood to split, and gives the fungus ready access to its interior. Of course the use of "green wood" is out of the question. As the resin and tannin (a preparatory stage in the formation of resin) afford food material for the fungus, pitch-pine cannot be considered to be rendered more, but rather less, durable by the large amount it contains. Wood must not only be dry, but be kept dry. This is impossible if the air of the chamber in which it is built is damp, as it condenses and absorbs moisture. To secure this, therefore, moisture must be prevented from rising from the soil by a layer of asphalte or concrete; from rising up the walls from the foundations by a damp-proof course; from soaking through the walls by building an air-drain, so that no earth is allowed to be in contact with them above the damp-proof course, unless asphalted outside or built hollow; and lastly by securing thorough ventilation, so that there is no corner where the air can stagnate. All vegetable soil must be removed from the site, for ammoniacal exhalations assist the germination of spores; the drains must be sound, and the mortar made of clean sand. The house should be well dried before the floors are laid and joinery fitted, and it has been suggested by Professor Hartig that the ends of all joists and timbers built into the wall should be previously creosoted, so as to protect them during the critical time when the walls are drying.

Wood should not be painted unless thoroughly dry, as it imprisons the moisture instead of allowing it to evaporate, and is thus no protection to dry rot. Linoleum on floors is objectionable for a like reason.

The darkness under boarded floors and behind skirtings is congenial to the fungus, and so too is the warm air produced by a heating apparatus; for it must not be forgotten that warm air will hold more moisture before it is saturated than cold air, and so absorbs it from whatever holds moisture, whether from damp ground or damp brickwork.

Nor must we forget when we ventilated under boarded floors by inserting air bricks, that a considerable draught is not at all a necessary consequence, as a column of air of uniform density will not readily move in a horizontal direction.

Many preservatives have been suggested, and many patents taken out for securing timber from dry rot,—by steeping in corrosive sublimate (mercuric chloride H_gCl_2) in Kyan's process, by injecting creosote under pressure in Bethell's, zinc chloride in Burnett's, and copper sulphate in Boucherie's. Of these, creosoting seems to be the most successful. Creosote is obtained in the distillation of coal tar, and probably owes its antiseptic properties to the presence of crude carbolic acid, which could not be used by itself, as it is slightly soluble in water. The effects attributed to creosote are as follow:—1. It coagulates the cell contents, thus giving solidity to young cells. 2. Absorbs oxygen from the cells. 3. Resinifies within the cells, and so excludes air-moisture. 4. Acts as a poison to fungi.

When, however, timbers are built into a house, it is impossible to impregnate them with poison. If they are attacked by dry rot, it will be necessary to find out the extent of the disease. This can be done to some extent by a scratching noise being made at one end of the

beam and listening at the other, for if the fibres are intact, the sound will readily be conveyed; if the beam is decayed, it will give a dull sound on being tapped, and will allow a gimlet to penetrate it very readily. If the fungus has only penetrated a short distance, the beam may be painted by corrosive sublimate dissolved in methyl alcohol, a method which Professor Hillhouse, of Mason's College, told me he had found very successful. Methyl alcohol has great penetrating power, and acts as a vehicle to convey the corrosive sublimate into the texture of the wood, evaporating in time, and leaving the corrosive sublimate behind to do its work.

In a slight attack, hot limewash may be sufficient.

Notwithstanding, however, the fact that decayed wood will absorb the washes more readily than sound, these frequently do not penetrate to a sufficient depth, and as only those parts of the mycelium of the fungus are killed which are in contact with the poison, the hyphæ in the deeper parts of the timber remain as active as ever; the rot is not stayed, but its ravages are now hidden from view. Except in a slight attack, then, it is better to take the timbers out and burn them, and then replace with new timber after having taken the precaution to see that the conditions favourable to fungus growth are no longer fulfilled. It would be an advantage also to disinfect the air. It is particularly necessary that all infected timber, and every particle of mycelium, and certainly every fructification, should be burnt.

In conclusion, I would say that dry rot is an easily preventible disease, though more difficult to eradicate when it has once obtained a hold. And I trust you may find this short sketch of the life history, habits, and suitable conditions of growth of *Merulius lachrymans* of some help when you have to deal with a case of "dry rot."

[A report of the discussion which ensued will be found in another column.]

Illustrations.

DESIGNS FOR A POST-OFFICE.

THE two designs of which we publish the elevations, were submitted in competition for the "Tite Prize," given by the Institute of Architects for a design on a given subject in the Italian style. The design submitted by Mr. J. J. Pearson, and which we have already noticed in the course of some brief remarks on the students' designs when they were exhibited, obtained a Medal of Merit, and is a design marked by a good deal of originality. Mr. Watson's design, less ambitious in style, has however a great deal of merit, and the contrast between the plain wall surface of the middle story, and the enriched upper story is very effective. The cornice is a little heavy in its details in comparison with the general scale of the elevation, but it is a design marked by good taste and refinement generally, and we have much pleasure in publishing it.

We subjoin reduced reproductions of the perspectives of the two designs.

THE AUSTRALIAN JOINT STOCK BANK.

This building, which we illustrate as a recent example of Colonial architecture, has been built from the designs of Messrs. Blackmann & Parkes, architects, of Sydney.

The foundations are of cement concrete, bedded in all cases on the solid rock.

The basement is 9 ft. high in the clear, and is lighted by five large areas, with heavy ornamental guard irons, and Hayward's glass prism lights over openings. The basement contains the strong-rooms and treasuries, built exceptionally strong, with basalt walls 2 ft. 6 in. thick, the stones dovetailed into each other and securely cramped together, and the door openings are provided with Chubb's best steel-plated fireproof and burglar-proof grilles and doors. The floor and ceiling of the treasuries have a double layer of 4-in. iron rails laid side by side embedded in the concrete, which for the treasuries is 5 ft. thick. The walls for basement are built with a 4-in. cavity in centre filled with asphalte, thus securing a damp-proof room. The floor and ceiling of banking-room are also composed of concrete,—the former laid with mosaic tiles, and the latter richly ornamented in Keen's cement and decorated.

The base-course round the building is about 7 ft. high, of polished grey "Aberdeen" granite, with all angles rounded, carved, and fluted, some of the blocks weighing nine tons each.

The columns for the banking-room entrance and windows are also of polished red and grey granite from "Inverness." All other parts of the building externally are built with the beautiful deep rich brown Sydney Pyrmont stone.

The entrance is 14 ft. wide and 30 ft. high, with an ornamental cast bronze door of a very rich design. The banking-room is 34 ft. high, with very solid and elaborate fittings of oak and mahogany. A hydraulic lift from the banking-room to the basement will communicate with the treasuries, and a passenger-lift is provided for in connexion with the grand staircase, to give access to the upper floors. The principal rooms, including the banking-room and treasuries, are ventilated through the cove of the ceiling, along which perforated pipes are laid, and exhausted by a fan driven with a gas engine syphoning the vitiated air into a flue above the roof. The gas engine will pump water into a large iron tank on the top of the building, from where pipes reticulate through the building to work the lifts and supply the copper hydrants, always ready in case of fire.

The conical domed roof over the banking-room it framed with iron, and covered with Muntz's metal and cast zinc ornamental cresting round the skylight. The statues are of sandstone, those each side of the entrance representing Justice and Plenty, and the carved panels Agriculture and Shipping.

DECORATIONS, BENTHALL HALL.

The manor and family of Benthall, or "De Benthall," are mentioned in many documents as far back as the end of the twelfth century. The Hall stands about three miles and a quarter north-east of the well-known Priory of Much-Wenlock, and a short distance from the village of Benthall, in the Coalbrookdale and Broseley district of Shropshire. The panellings illustrated are good specimens of a style of work which, notwithstanding its grave faults, finds many admirers.

They are reproduced from measured drawings by Mr. B. J. Fletcher, of Coalbrookdale.

THE "REGISTRATION COMMITTEE" AND THE INSTITUTE.

We are asked to publish the following letter which has been sent to the President and Council of the Institute of Architects:—

"The Architects' and Engineers'
Registration Act Committee,
39, King-street, Cheapside,
London, E.C., Feb. 20, 1888.

Architects' and Engineers' Bill.

Sirs,—Your secretaries' letter to the professional journals last week insinuates that the petition sent out for signature by this committee is calculated to mislead those members of your Institute to whom it was sent. You must be perfectly well aware that such could not possibly be the case, as you received copies yourselves, with the accompanying circulars, addressed from this committee, 39, King-street, Cheapside, E.C., and both signed by myself.

No member of your Institute can possibly be so hopelessly ignorant as to suppose for one moment that the offices of your Institute are situate at 39, King-street, Cheapside, or that your secretary is

Your obedient servant,
Edgar Farman, Hon. Sec.

To the President and Council,
The Royal Institute of British Architects,
9, Conduit-street, Regent-street, W.

P.S. As your secretaries have introduced Colonel Duncan's name into this matter, please let it be distinctly understood that gentleman has nothing whatever to do with the promotion of this Bill outside the House of Commons."

*** We may remark in reference to this that we learn that already several members of the Institute have informed the Secretaries that they had been misled, and had signed the form of petition referred to under the full impression that it emanated from an official Committee of the Institute.—Ed.

Washable Wall Papers.—The patentees of these papers write to say, in reference to our notice of them in last number, that the smoking-room at the Grand Hotel is done with their "Embossed Tapestry," not with "Muraline Brocade."

THE ARCHITECTURAL ASSOCIATION.

The ninth meeting of this Association for the present session was held on the 17th inst. in the meeting-room of the Royal Institute of British Architects, Mr. H. D. Appleton (Vice-President) in the chair.

The following new members were elected, viz., Messrs. T. R. Hooper, A. D. Smith, W. E. Barry, A. H. Goodman, J. Stransom, J. B. Gridley, A. L. T. Tilley, V. J. Imossi, P. M. Horder, E. A. Runtz, W. H. Byrne, E. Stanger, and E. Berkley.

A vote of thanks was passed to Mr. Arthur Baker for allowing the members to visit St. Paul's Church, Kensington, and a similar compliment was passed to Mr. Bernard Smith for permitting them to inspect the house at Palace Court, Kensington.

The Chairman stated that very few names had been sent in for the Italian Easter excursion, and he invited any who thought of going to intimate the same as soon as possible, so that the necessary arrangements might be made.

Mr. W. H. Bidlake, M.A., then read an interesting and able paper entitled "A Botanical Contribution to Architecture," which we print elsewhere. As will be seen, it was an account of "Dry Rot" and its causes.

Mr. J. Osborne Smith, in opening the discussion, said he had frequently come across dry-rot in buildings, and had invariably found it most difficult to deal with when once it had got hold of a place. He remembered an old house which had been attacked by dry-rot for a number of years, and though the affected parts that could be seen had been carefully extricated from time to time, yet when he came to make some extensive additions to the building, he found that the builder's extras were considerably increased by the hidden ravages of that very serious enemy. Some six months after the alterations were completed, a new door-jamb was built into an opening cut in the old wall, and became completely rotten within six months, so much so that a pen-knife could be easily pierced through its 2 in. of thickness. That was caused by a hot-water pipe, running within 18 in. of the bottom of the door. In making good the door-jamb no doubt the work was rapidly put up, and the moisture in the brickwork, with the heat created by the hot-water pipe, caused the tendency to decay. In another old house, with defective flooring, he saw a large beam, about 7 ft. long, taken out, so completely affected by dry-rot that it scarcely weighed 1 lb. Indeed, it looked just like an iron rod encased in light cotton wool, and nearly all the floor joists were in the same condition. He had never understood until he heard Mr. Bidlake's paper how the dry-rot spread. Not long ago he opened in Brighton an old disused cellar, the brick lining and vaulting of which were completely covered with the white substance, while the floor looked as though there had been a heavy snow-fall upon it. That cellar had been almost hermetically sealed, and both moisture and warmth were present. Such papers as Mr. Bidlake's were extremely valuable, and it afforded him much pleasure to propose a vote of thanks to Mr. Bidlake.

Mr. H. W. Pratt seconded the motion, adding that it was impossible to imagine a more perfect lecture on the subject of dry-rot. In the case of those who had a town practice, the trouble in connexion with dry-rot was the difficulty of getting any amount of ventilation under the floors, and the best way to meet that would really be to do away with the underneath space altogether, and go in for solid floors. It was also difficult to know to what extent the disease had spread, and how far it was necessary to condemn the floors and timbers.

Mr. King said he understood there was a wet-rot, as well as a dry-rot, and he would like, if Mr. Bidlake could say, whether or not it was a fungus.

Mr. J. Osborne Smith supplemented his former remarks by inquiring whether it was not dangerous to use moist substances between joists, such as the ordinary plaster pugging? He cited a case of a church with a large room underneath. The floor of the church was pugged and the work done quickly. In the underneath room a good deal of gas was used, and considerable heat was generated by the heating apparatus, so that in a couple of years the floor was found to be completely rotten. The only reason that could be given for the result was that the moisture arising from the heat evaporated through the pugging, and was kept in by linoleum, which,

foolishly enough, had been put down on the floor. He had never since then used any moist substance for pugging.

The Chairman, in putting the vote of thanks, said that he had had a case of dry rot which occurred in a public building erected on the site of an old chalk-pit, containing at one end a large quantity of disintegrated chalk. It was not considered worth while to spend money on removing that, but in two or three months from the floors being covered in, and before the building was finished, the dry rot began with the joists, the ultimate result being that the disintegrated chalk had to be removed in baskets. He understood that some of the older houses on the clay at Streatham had been built with elm foundations, and had stood remarkably well without any serious settlement. He should like to know how long elm foundations would last.

The vote of thanks was very cordially received.

Mr. Bidlake, in replying, said that undoubtedly myriads of the spores produced by fructification were blown about, and transported on the workmen's clothes and implements; while much timber, he believed, had the spores resting on its rough surface. But for those spores to germinate certain conditions must be fulfilled, and until quite recently it had been a difficult matter to get the spores to germinate artificially. Dry rot might therefore be prevented by taking care that the conditions favourable for germination were not fulfilled. When dry-rot had attacked a beam it was a much more difficult matter, and unless the attack was a slight one, it was really better to take out the beam and burn it. The attacked part might be cut off, but if only an inch or two of the mycelium was left in the remaining portion sufficient might be present to produce rottenness of the whole beam. The only way to stop the fungus, when it had attacked a beam, was to soak it through and through with corrosive sublimate dissolved in methyl alcohol, as the ordinary hot lime-wash was then useless. Wet-rot was quite a different disease, though the ultimate effect on the wood was virtually the same. In both dry-rot and wet-rot, the highly complex substances composing wood became oxidised and broken up into simpler ones; but while in the former case the oxidising agent was a fungus which required a stagnant atmosphere, and the substances were appropriated by it for its nourishment, in the latter, the disintegration of the substance was induced by air and water, accelerated by warmth, and the products were diffused into the air as gases, and carried away. Timber alternately wet and dry was most susceptible to wet-rot, and an explanation was afforded by the fact that in the process of seasoning by boiling it was found that the timber lost weight, and that if the process were successively repeated the timber became successively lighter. The proteid and nutrient substances were first dissolved, but as the lignin composing the wood cells was not a simple chemical substance, but a group of such, it was probable that some of those are slowly dissociated out and dissolved, and so the wood disintegrated.

COMPETITIONS.

Hope Chapel, Wigan.—We are informed that 150 applications were made in answer to advertisements, and that thirty-four sets of drawings were sent in for competition. The drawings were on public view. Nine sets were recommended by the Sub-committee, viz., those by Mr. R. A. Lewcock, London; Mr. B. Laurence, Newport, Mon.; Messrs. Mercer & Allender, Liverpool; Mr. B. Nightingale, Bolton; Messrs. Howard & Smith, Manchester; Mr. George Heaton, Wigan; Mr. S. Harris, West Kirby; and Messrs. Simon & Capper, Edinburgh. In the result the plans of the last-named gentlemen were adopted, and they were awarded the premium of 25*l.*; Messrs. Mercer & Allender, of Liverpool, were second.

The Armada Memorial, Plymouth.—We hear that the successful competitor for this work is Mr. Herbert A. Gribble.

Town-hall, Motherwell.—Referring to the short notice in our last week's issue [p. 128] respecting the opening of the new Town-hall and Municipal Buildings, Motherwell, near Glasgow, we are asked to mention that the floors have been laid on Lowe's Patent System of Wood-Block Flooring.

THE CLERKS OF WORKS' ASSOCIATION OF GREAT BRITAIN.

ANNUAL DINNER.

THE fifth annual dinner of this Association was held on Monday evening at the St. James's Hall Restaurant, Mr. Banister Fletcher, F.R.I.B.A., presiding, supported by Professor T. Roger Smith, Mr. Stephen Salter, Mr. W. D. Scott Moncrieff, C.E., Mr. H. H. Leonard, Mr. F. Adams Smith, Mr. Walter Davies, Mr. J. Osborne Smith, Mr. F. H. A. Hardcastle, and many other visitors, besides a very large number of the members.

The usual loyal toasts having been honoured (Mr. J. Aitchison responding for "The Army, Navy, and Reserve Forces"),

Mr. J. Wilkinson proposed "The Architects and Engineers," to whom he said the members of the Association, individually and collectively, were greatly indebted for encouragement and support. He trusted that the members of both professions would soon be fully occupied, for the clerks of works would be sure to share in the prosperity of the professions. With the toast (which was very heartily received), he coupled the names of Mr. Stephen Salter, F.R.I.B.A., and Mr. W. D. Scott Moncrieff, C.E.

Mr. Salter, in replying, said that the architectural profession could not help feeling a great deal of interest in the prosperity of the Clerks of Works' Association, the members of which were a very necessary and a very important body of men,—men in whom was reposed a great deal of trust and responsibilty. A good clerk of the works had to be not only an honourable man, but he had to know all the ins-and-outs of every trade connected with building. Never in his experience had he found a clerk of the works unworthy of the confidence reposed in him. In addition to the qualities he had already enumerated, a clerk of the works needed a great deal of temper, judgment, and discrimination, for he had to meet all sorts of men connected with the different trades, and to discuss matters with them. This was a very important part of a clerk of works' duties, and called for considerable tact.

Mr. Scott Moncrieff also replied on behalf of the civil engineers, and enlarged on the intimate connexion between engineering and architecture. In some works, such as important terminal railway stations, it was of undoubted advantage for the architect and the engineer to be conjoined. Although, as an engineer, he was hardly prepared to admit that ornament was always safe in the hands of an architect, yet he thought that as a rule it was very much safer in his hands than in the hands of the engineer. (Hear, hear.) But in other matters the architect and the engineer could work together with advantage in several fields, one of which was that of sanitation, especially in the case of large buildings. Further scope for the engineer in connexion with buildings was to be found in the gradually increasing use of the electric light, in spite of the somewhat unfatherly legislation on the subject promoted by Mr. Joseph Chamberlain.

Mr. Linn Dillon, in an eloquent speech, proposed "The Surveyors," investing the toast with something like a poetic interest, and feelingly referring to recent losses in the profession. With the toast was coupled the name of Mr. H. H. Leonard, who briefly responded.

The Chairman, in proposing the toast of the evening, "The Clerks of Works' Association of Great Britain," congratulated the members on the flourishing state of the Association, the success of which had certainly been very remarkable, considering that it had only been established some six years. That it had so quickly acquired stability and success spoke well for the organising and administrative capacity of those who managed its affairs. The Chairman went on to quote with hearty commendation several extracts from the rules, which he thought were all that could be desired, notably the one which was devised for admitting none but competent men within its pale,—none but those "who could produce ample evidence of possessing the necessary qualifications." Seeing how carefully entrance to the Association was guarded, he could conceive no better guarantee of competence in a clerk of works than his possession of the Association's certificate of membership. Possibly in the future the Association would be able to take into consideration with advantage the feasibility of co-operating with the Carpenters' Company and others with a view to the promotion of technical instruction and examinations for the building trades. He agreed with Mr. Salter in his estimate of the position of a clerk of works. It was one of increasing importance, for the clerk of works was to a great extent the deputy of the architect.

Mr. Hocking, the President of the Association, responded.

The next toast was, "The Honorary Treasurer, J. Oldrid Scott, Esq., F.R.I.B.A." whose great services to the Association were referred to by the proposer, Mr. P. J. King.

Mr. John Smeaton proposed "The President, Vice-President and Committee," coupled with the name of Mr. E. Moore, who responded.

"The Worshipful Company of Carpenters" was proposed by Mr. F. Dashwood, the Secretary, who referred to the very handsome manner in which the Carpenters' Company had placed a room at their hall, at the disposal of the Association for its meetings, for the use of their library, and for the way in which, at Stratford and elsewhere, the Company was promoting the cause of technical education in the building trades. For these things the Association had to thank the kind influence of Mr. Banister Fletcher, Mr. S. W. Preston, the Clerk of the Company, and Professor T. Roger Smith, the Surveyor to the Company. As Mr. Dashwood's speeches always finish with a humorous story, he told of his experiences with a would-be clerk of works who had only imbibed his ideas of building work from a technical school, but who was quite nonplussed when asked to solve a very simple practical problem. With the toast he coupled the name of Professor Roger Smith.

Prof. T. Roger Smith, in replying, asked for the co-operation of the members of the Association in making the forthcoming exhibition of the Carpenters' Company a success.

The remaining toasts were "The Press" (proposed by Mr. J. Woodley, and coupled with the name of the representative of the *Builder*), "The Visitors" (proposed by Mr. G. Dalton in a humorous speech, and responded to by Mr. Stanton William Preston), and "The Chairman" (proposed by Mr. J. Brady).

THE ARCHITECTS', ENGINEERS', AND SURVEYORS' REGISTRATION BILL.

SIR,—The Council of the Surveyors' Institution observe that a self-constituted body entitling themselves "The Architects', Engineers' and Surveyors' Registration Act Committee" are promoting a Bill in Parliament for the compulsory registration of Architects, Engineers, and Surveyors.

The composition of the committee is accurately described in the letter from the Secretaries of the Royal Institute of British Architects, published in the *Times* of the 7th inst.

So long as the committee confined themselves to meetings and conferences, this Institution did not care to concern itself with their proceedings. But now that it has come to the knowledge of the Council that copies of an ingeniously worded petition in favour of the Bill have been widely circulated for signature among the members of this Institution, I am requested to state that the Bill has been prepared without the cognisance or approval of the Council of the Surveyors' Institution.

The Council hold (whatever may be the abstract merits of the principle of registration, under the auspices of the three chartered bodies concerned) that these particular proposals, if sanctioned by Parliament, so far from protecting the public from unqualified practitioners, would have the effect of giving a status, not to be otherwise secured, to the ignorant and incompetent persons who hang upon the fringes of the three professions.

J. C. ROGERS, Secretary.

The Surveyors' Institution,
12, *Great George-street Westminster,*
Feb. 22, 1888.

SIR,—This extraordinary and undesirable measure should, I venture to say, receive the determined and zealous opposition of all gentlemen claiming the title of architect.

I understood Mr. Waterhouse to give a distinct statement, from the chair, at the meeting of the Royal Institute of British Architects, on the 20th inst., disclaiming, on behalf of the Institute, all countenance and support to the Bill; and I was glad to see that a discussion on the subject was not then allowed.

But, it should be pointed out that something more than a passive resistance is necessary.

Our opposition, to be of any real use, should be known in the House of Commons before the second reading of the Bill comes on; and I suggest that a memorial be drawn up at once, petitioning against the Bill, and the whole profession canvassed on the question.

This could be easily done; the memorial could lie at the Institute for signature or be posted to members.

I should be happy to contribute my share of the expenses to this course.

We need not be opposed to the registration of *architects* in taking this step.

The accumulative title of the Bill is manifestly offensive and injurious, for how are house and estate agents, appraisers, auctioneers, and others who take the title of architect because, I suppose, it begins with A, to be excluded?—for many of these claim to be surveyors also.

I strongly protest, and several others who think with me, to being classed with a number of trades, or even with other professions.

Will the profession stand by in silence, and allow this cheque of impudence to be drawn upon our honour?

H. Hardwicke Langston.

9, *Great James-street, Bedford Row,*
Feb. 21, 1888.

IN RE QUANTITIES, PLYMOUTH BOROUGH ASYLUM.

Sir,—Our attention has been drawn to an advertisement in the *Builder* of the 11th inst., inviting tenders for the above.

This advertisement, which has been inserted without consultation with us, states that "the Committee do not hold themselves responsible for the accuracy of the quantities, which must be verified by persons desirous of tendering."

May we be allowed to state that during a practice extending over more than thirty-five years, we have always held ourselves responsible for the accuracy of our quantities, as, surely, do all surveyors of repute?

The notification that the quantities must be verified is most unreasonable; it is generally quite impossible for persons tendering in the short time which elapses between the issue of the quantities and the delivery of the tenders.

Widnell & Trollope.

13, *Parliament-street,* Feb. 17.

THEATRE PLANNING.

Sir,—After the discussion at the Institute on the 6th inst. [see *Builder,* p. 100, *ante*] many of those present had the curiosity to examine the model in which I have suggested a safeguard for theatre-goers, but I did not notice Mr. Nevill amongst them. Many others have been to see it at my office, and, although a few demurred at first to the reversal of their accustomed mode of exit, all are finally convinced by the argument that every step is down towards the exit door, and that the number of those steps is reduced to a minimum.

It certainly has not even yet occurred to me that every one who has planned a theatre has thought of and rejected this idea. Like most simple things, it is obvious when pointed out.

I can only repeat, in reply to Mr. Nevill's letter [p. 125, *ante*] that the doorways are at the extreme sides of the house, therefore no one would be so foolish as to clamber over the seats in front of him to reach these doorways. Also, that some galleries are already provided with such side doors at or about their lowest level, and that I have never heard of people being pushed over the front, as Mr. Nevill imagines.

As to disturbance by late comers, those who enter the front rows are a nuisance in any case, while my system enables them to find their seats at a glance.

I might have mentioned that the system exists in some concert halls, &c.; but that the term "theatre" is universally applied to that class of building, with a stage and several ranges of "boxes" or "circles," and that these are universally entered from corridors at the back.

With reference to my increased accommodation, Mr. Nevill kindly admits that "the only opening for economy of space is in the arrangement of staircases." Exactly so. I put the staircases just where they are wanted, the back corridors disappear, and the space usually occupied by them is devoted to seats.

Even when the dress-circle is raised and required stairs, I get 1,024 seats, and where it is level with the street, I get 1,244, in each case within the same area as an existing theatre, which contains only 766.

This is a fact which must appeal to managers, and which shows that, if they cannot secure an isolated site, they can afford to sacrifice a few hundred seats in order to reduce the width of the building, and so secure isolation.

The pit entrance and the several exit doors shown on my model do not require a carriage-approach; a passage 6 ft. or 8 ft. wide will suffice to escape by. My second plan, with the 1,244 seats, requires no side entrances at all.

I thank Mr. Nevill for giving me this opportunity of pointing out the advantages of my suggestion.

Edward J. Tarver, F.S.A.

P.S.—I add the title "F.S.A." in this case, because, as an antiquary, I gained my idea from the amphitheatres built by those practical ancient Romans.

OILING STONE.

Sir,—Would one of your readers have the goodness to favour me with his experience in the oiling of stone?

The case in point is a blue York landing imbedded in the earth. If this is coated with oil before being fixed, will it prevent the damp from rising and tend to preserve the stone? And what kind of oil should be used?

Monument.

*** We should very much doubt its efficacy.

BRASSES AT ALLHALLOWS BARKING.

Sir,—The following few notes on the Flemish brass at the Church of Allhallows Barking, mention of which was made at the lecture delivered by Mr. Oliver to the Architectural Association last month [see pp. 30, 32], may be of interest to some of your readers.

The brass contains, besides the figures of Evyngar, his wife and children, three shields; that at the feet of the figures is inscribed with his merchant's mark; the others, one at each upper corner of the brass, are respectively charged with the arms of the Salters' and Merchant Adventurers' companies. The inscription is as follows:—"Off your charite pray for the sowls of Andrew Evyngar, cytezen and salter, of London, and ellyn his wyff, on whos sowlys Jhesu have mercy, amen." Haines, on the authority of Mr. J. Weale, of Bruges, states that Evyngar is an Anglicised corruption of Wyngaerde, the name of a family formerly residing at Antwerp. The Salters' Company, chartered in 1364, were incorporated in 1530, when they had the following arms granted them:—Per chevron *azure* and *gules*, three sprinkling salts *argent*. Wodderspoon, in his "Memorials of Ipswich," when speaking of the Pounder brass in that town, refers to the great similarity between it and the Evyngar brass. Referring to the Pounder brass he says:—"Little doubt exists that this fine brass is the workmanship of a foreign (probably a Flemish) workman, and is attributable to the same artist who cut the fine brass of Andrew Evyngar and family in Allhallows Church Barking, London. The dates of these brasses are severally, Pounder, 1525; Evyngar, 1536; and both furnish a variety of valuable heraldic illustrations. Each bears upon a shield its respective marks; Pounder carries on two shields the arms of Ipswich dexter and the Merchant Adventurers sinister; and Evyngar bears the arms of the Merchant Adventurers and the Salters. Some other parts of the designs of both disclose an identity of style and taste, and the touch and stroke of the graver are far from dissimilar in each example. Although upwards of a dozen specimens of Flemish brasses have been found, yet the Pounder and Evyngar brasses are the only two which partake of an identity of style." Westlake, in his "History of Painted Glass," refers to the Merchants' mark of the Evyngar brass in his refutation of the theory that the signature on the Amalakite's sword in the glass at Fairford was that of Albert Dürer, and that the stained glass there was therefore that great artist's work. Wodderspoon, in his book, has a good engraving of the Pounder brass; and there is a splendid plate of the Evyngar brass in Waller's "Monumental Brasses."

E. Doran Webb.

The Student's Column.

IRON.

VIII.—CAST IRON.

GRAY iron is soft and tough. White iron is hard and brittle. Gray iron is more porous, and rusts sooner than white iron. In white iron we have a carbide of iron, not pure iron. Dark iron has a less specific gravity than white iron. The mixture of the metals for various kinds of work is an important feature. The white iron costs less than gray iron, and is chiefly used for making the lowest qualities of bar iron. Gray iron is principally used by ironfounders, a small quantity of white metal being only added, when specially hard castings are required. The best mixture of iron for any special purpose is more the study of the ironfounder than of the designer. The designer specifies certain tests, and the manufacturer has to supply a material that will stand this test. Bearing in mind the purpose for which the casting is intended, the manufacturer selects such iron as his knowledge and experience assure him will be best. For instance, for cylinders, pigs which would produce iron strong, close, and non-porous would be wanted; while for machine wheels the metal would be selected from pigs which would produce iron strong, not close, and, of course, it would not matter about its being porous. The greater the specific gravity of the metal, the greater is the strength. There are exceptions, in consequence of flaws, &c., but the rule is general:—

	Specific gravity.	Transverse strength.
White iron...	7·3 to 7·5	530 to 537 } Breaking weight,
Gray iron ...	7 to 7·2	357 to 527 } in lb. per sq. in.

Mottled iron is only fit for the manufacture of wrought iron. The presence of silicon, sulphur, and phosphorus weakens the tenacity of cast iron, and hence iron smelted with charcoal has been preferred to that smelted with coal and coke. The railings round St. Paul's Cathedral were cast with iron smelted from charcoal. Charcoal iron is still used for malleable cast iron. The carbon is variable in coal and charcoal alike. Highly phosphorised iron is very fluid. White iron dissolves almost entirely in hydrochloride acid. All the carbon in the iron unites with the hydrogen,—

$$Fe\,C_x + HCe = FeC_e + C_xH.$$

White cast iron can be converted into the gray variety by melting and allowing it to cool slowly. Refined and homogeneous iron can be produced by mixing proper kinds of pig iron together, casting them again into pigs and re-melting them for castings. The tenacity of cast iron is found to be increased by the process of re-melting, probably because some of the uncombined carbon is thereby induced to combine with the iron. Toughened cast iron can be produced by melting with the cast iron an addition of 15 to 25 per cent. of its weight of wrought-iron scrap. When cast iron is to be employed only for inferior purposes, it may be run into moulds direct from the blast furnace, but for superior work the pigs have to be re-melted in a cupola constructed in a foundry in a somewhat similar way to a blast-furnace, and the metal is specified to be of the second melting. A little limestone is added as a flux, which combines with some of the impurities left in the pigs, and removes them in the form of slag. The iron is next run into moulds of sand, sometimes of a rather clayey nature, but the best for moulding purposes is the red sandstone sand. This clean red sand is placed against the pattern in the box or pit where the casting is to be made, and then any kind of sand is used for packing up the sides. The sand in the box is well rammed down, and sometimes a good many nails are inserted in the sand of the top box, to prevent the sand falling down when the top box is lifted off the bottom box to remove the pattern, which occupies the place of the proposed casting. Before removing the pattern, the moulder takes a wet brush and squeezes water out of it gently, all round the pattern, so as to prevent the pattern drawing out any sand with it, as the water will help to bind the sand all round the pattern, and thus the wood pattern can be removed without endangering the stability of the mould.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

2,300, Window and Door Fasteners. W. Pyne.

This invention is designed to prevent any possible vibration of the frames, and to prevent them from being opened from the outside, and the fasteners bring the sashes and casements into closer contact, so as to make them more thoroughly weatherproof. A metal plate is fastened to the upper sash in such a manner as to receive a hinged projection, on which it works freely, which projection has a circular or hollow recess formed therein. On the lower sash a metal plate is fixed, having a projection which is moved round when the window is fastened, and brings the sashes securely and firmly together.

3,459, Door Stops. F. Sage.

According to this invention, the stop itself consists of a length of wood, by preference grooved on one side, and having a half groove or rebate on the other. The invention relates principally to a form of stop suitable for doors, fanlights, and the like, and is more especially designed for use in fitting up partitions in offices, warehouses, &c. When the stop-piece is fitted to the framing, the door is hinged to the rebated surface of one piece, and strikes against the stop or raised part of the piece on the opposite side of the doorway.

7,381, Concrete and Artificial Stone Mantelpieces. J. Dudley and J. Hamilton.

Metal or wooden moulds are used by the inventors, and the shelf, frieze, and jamb are all cast in one. Portland cement is mixed with suitable core in a wet state. When sufficiently dry, it is removed from the mould.

7,808, Screws and Screw-drivers. L. E. Santer.

With the object of giving a more secure grip or hold to the screw-driver, the head of the screw is made, according to this invention, with a different-shaped nick or slit, and the screw-driver end is shaped to correspond. Sometimes the screw-driver is used at an angle to the work, and not in a direct line; this is according to the nature and position of the screws.

16,930, Floors, Roofs, and Fireproof Partitions. C. L. Gocht (Chemnitz).

According to this invention, a T-piece is used, the top of which is embedded in the floor, while the other end is built around, or the T-piece is fixed in such different positions and materials as specified for convenience, strength, and to ensure the fireproof quality of the building.

16,391, Chimney-tops, Ventilators, &c. J. Gowland.

This invention relates to improvements in the chimney-tops or cowls of revolving pattern. Doors or orifices are formed, which are alternately closed and opened by plates on the outer cylinder of the cowl. The orifices are placed so as to ensure a draught, and guards prevent the wind from being blown down the chimney or shaft.

NEW APPLICATIONS FOR PATENTS.

Feb. 10.—2,014, J. Dargue, Window-sash Fastener.—2,043, W. Davis and J. Crouch, Doors.

Feb. 11.—2,081, J. and J. Hill, Automatic Saw Sharpening Machine.—2,110, R. Haddan, Window Guards.

Feb. 13.—2,164, G. Wimpey, Joint for Stone-ware, Gas, and Other Pipes.—2,180, H. Wien, Water-closet and Privy Seats.

Feb. 14.—2,184, E. Story and R. Punshon, Manufacture of Glass.—2,193, J. Rogers, Flushing Cisterns or Water-waste Preventers.—2,195, J. Hall, Kitchen Grates.—2,204, J. Simpson and S. Porter, Excavators.—2,226, G. Ewart, Window Ventilation.—2,228, J. Crowther and W. Payne, Pivots of Fanlights, &c.—2,239, J. Mayfield and J. Todman, Electrical Door and Window Contact.—2,256, W. Carden, Grates or Fireplaces.

Feb. 15.—2,264, E. Taylor, Attaching Knobs or Handles to Doors, &c.—2,272, J. Bassett and F. Seyde, Fireproof Ceilings and Partitions.—2,285, H. Tullet, Safety Sash-fastener.—2,288, H. and I. Storey, Decorative Material for Walls, &c.—2,298, J. Jetten, Rails, Rafters, and Purlins in Wood or Metal for Fixing Glass, Slates, or other material used for Windows, Greenhouses, &c.—2,304, S. Sudworth and E. Berry, Fireproof "Batten" Lights for Electrically Lighting the Stages of Theatres and other Buildings.—2,299, F. Hubber, Basins for Water-closets.

Feb. 16.—2,334, J. Walker, Mounts for Door and other Knobs.—2,366, G. Snelus and Others, Manufacture of Cement.

PROVISIONAL SPECIFICATIONS ACCEPTED.

2,757, T. Whitaker, Excavating.—15,188, G. Wicks, Raising and Lowering Window Sashes without Weights, and Reversing them.—17,088, A. Crombie, Joint for Drain Pipes.—15, M. Williams, T-squares and Templates for describing Circular Arcs.—29, J. Barnard, Slow-combustion Stoves.—444, J. Hall, Fire-brick Register Grate Backs.—495, S. & T. Cooper, Roofing Felt.—673, E. McClellan, Air Inlets for Sewers, Traps, and Drains.—682, E. Gotto and Others, Supplying Water to Water-closets, &c.—735, R. Melhuish, Combination Tool Cabinet and Bench.—890, E. Brett, Ventilating Apparatus.—1,071, A. Bowley, Clutch.—1,389, O. Erfurth, Holder or Support for Scaffolding.

COMPLETE SPECIFICATIONS ACCEPTED.
Open to Opposition for Two Months.

5,171, N. Helme and Others, Paperhangings.—5,231, W. Orr and P. Brown, Sheet Metal Structures, and in Columns and Beams therefor, the latter also applicable for Building purposes generally.—5,288, G. Woolliscroft, Attaching Knobs or Door-handles to Spindles.—5,678, C. Redman, Raising and Lowering Tables of Circular Saw-benches, &c.—5,762, T. Panario, Water Waste-preventers.—15,475, T. Letheren, Silent Water Waste-preventer Cistern.—17,619, W. Wallis, Connecting Taps to Pipes.—457, T. Forsaith, Double Hand Saw, with adjustable Frame for Cutting Tenons.—678, J. Nipper, Distemper Colours.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

FEBRUARY 15.

By COLLETT & COLLETT.

Notting Hill—15, Convent-gardens, 74 years, ground-rent 8*l.* £170

FEBRUARY 16.

By H. C. WOOD.

Haverstock Hill—25, Herbert-street, 80 years, ground-rent 5*l.* 325

By REYNOLDS & EASON.

Camden-road—88, Brecknock-road, 60 years, ground-rent 6*l.* 450

Hampstead-road—134, Stanhope-street, 50 years, ground-rent 6*l.* 690

By E. TOMKINS.

Kingsland—33 to 51, Phillip-street, 18 years, ground-rent 61*l.* 10s. 745

By NEWBON & HARDING.

City-road—63, Westmoreland-place, 16 years, ground-rent 5*l.* 5s. 165

Burton-crescent—5, Thanet-street, 18 years, ground-rent 8*l.* 8s. 210

Islington—75, Norfolk-road, 72 years, ground-rent 6*l.* 295

15, Northampton-street, 36 years, ground-rent 4*l.* 235

Kingsland—2, De Beauvoir-crescent, 42 years, ground-rent 1*l.* 350

Dalston—29, Ferncliffe-road, 74 years, ground-rent 6*l.* 350

Notting Hill—94, Elgin-crescent, 63 years, ground-rent 15*l.* 475

A Tunnel in Rome.—The Corporation of Rome has decided upon constructing a tunnel in that city, viz., from the Piazza de Spagna to the Via Nazionale, thus connecting the old part of the city with the new. The tunnel will run through the Quirinal Hill, from Via Tritone to Via Nazionale, and be 340 mètres in length.

MEETINGS.

SATURDAY, FEBRUARY 25.

Builders' Foremen and Clerks of Works' Institution.—Annual Dinner, Holborn Restaurant. 6 p.m.

Edinburgh Architectural Association.—Visit to Inveresk Lodge, Halkerston Lodge, and Brunstane House.

MONDAY, FEBRUARY 27.

Royal Academy.—Professor J. H. Middleton, M.A., on "The Christian and Pagan Element in Mediæval Sculpture," I. 8 p.m.

Society of Arts.—Mr. J. Mayall, jun., on "The Modern Microscope." 8 p.m.

Midland Institute, Birmingham.—Mr. H. H. Statham on "The Artistic Spirit in Manufacture."

TUESDAY, FEBRUARY 28.

Institution of Civil Engineers.—Papers by Mr. R. A. Hadfield on "Manganese in its Application to Metallurgy," and "Some Novel Properties of Iron and Manganese." 8 p.m.

Museum of Archæology, Cambridge.—The Rev. G. F. Browne, B.D. (Disney Professor), on "Sculptured Stones of pre-Norman Type in the British Islands," V. 2·30 p.m.

Builders' Clerks' Benevolent Institution.—Twenty-first Annual General Meeting. 7 p.m.

WEDNESDAY, FEBRUARY 29.

Society of Arts.—Discussion on Mr. Swire Smith's paper on "The Technical Education Bill." 8 p.m.

THURSDAY, MARCH 1.

Royal Archæological Institute.—(1) Mr. E. J. Hopkins, Mus. Doc., on "The English Mediæval Church Organ." (2) The Rev. Sir Talbot H. B. Baker, Bart., on "Churches in South Gothland." 4 p.m.

Parkes Museum.—Mr. C. Sims Woodhead, M.D., on "Milk and Disease." 5 p.m.

Society of Antiquaries.—Election of Fellows. 8·30 p.m.

FRIDAY, MARCH 2.

Architectural Association.—Mr. F. M. Simpson on "Old House Work." 7·30 p.m.

Royal Academy.—Professor J. H. Middleton, M.A., on "The Christian and Pagan Element in Mediæval Sculpture," II. 8 p.m.

SATURDAY, MARCH 3.

Association of Public Sanitary Inspectors.—Mr. S. Fairchild on "Plumbers' Work in Dwelling Houses." 6 p.m.

Miscellanea.

Manchester Cathedral.—We understand that another appeal is about to be made to the citizens of Manchester for contributions towards the cost of completing the restoration of the Manchester Cathedral. In 1883, as the result of a meeting which had been held, certain works calculated to involve an expenditure of 30,000*l.* were entered upon, these works including the erection of a new northern porch, with a muniment chamber; a new southern porch, of considerable size, with a room over it, &c. During the five years which have elapsed the contributions received have amounted to 22,000*l.*, but it is now found that at least 15,000*l.* or 20,000*l.* more will be required, notwithstanding the fact that the family of the late Mr. Craven have paid 3,300*l.* for the erection of the north porch, in memory of their father. A meeting was accordingly held in the Mayor's parlour of the Manchester Town-hall, last Tuesday, to consider what should be done. The Bishop of the Diocese, who presided, spoke strongly in favour of the present proposals being extended so as to allow of the nave being lengthened. He declared that at present, so far as the nave was concerned, the Cathedral was a "deformity," although it might be one of the handsomest churches in all England. But Lord Egerton of Tatton was opposed to the Bishop's suggestion, saying that if they once patched up an old building in that sort of way they destroyed the original idea and the original proportions. If, he added, they wanted to build a new Cathedral they should have thought of it prior to 1883. The Bishop's suggestion was not adopted, but it was resolved to make a public appeal for 15,000*l.* to defray the cost of the works which were reparted by the architect as necessary for completing the restoration. Subscriptions to the amount of 1,250*l.* were promised in the room.

A Grindstone Truing Machine. — A modification of the fluted grindstone dressing-machine has recently been introduced by Mr. John Jardine, of Nottingham. It consists of a roller with a spiral fluting formed on it. This constitutes the cutting tool, and it is brought up to the stone by means of a hand-wheel actuating a screw. The spiral fluting is right-handed for half the length of the roller, and left-handed for the remaining half. In machines having a continuous spiral there is necessarily considerable end pressure on the side of one of the bearings, and this has been found an appreciable disadvantage; but in the machine in question the left-hand thread acting in opposition to the reverse one the end pressure is neutralised.

British Archæological Association.—At the meeting of this Association on the 15th inst., Mr. Cecil Brent, F.S.A., in the chair, it was announced that an invitation to hold the Congress for the present year at Glasgow had been accepted. Visits will be paid to Linlithgow, Stirling, and many other of the places of importance around the city. The exhibition now being promoted at Glasgow will have an important section devoted to archæology, and the ancient Palace of the Bishop is to be reproduced. Mr. Loftus Brock, F.S.A., exhibited some Greek statuettes of terra cotta from Asia Minor, showing some curious examples of female costume, one of the figures having hanging bands not unlike the so-called "stole" on the sculpture recently found in the Roman wall at Chester. Mr. J. Silvester exhibited a series of pre-historic flint flakes and scrapers, bones of animals and men found in some excavations made on his estate at Seade, Petersfield, which he described. Two of the three tumuli referred to have been opened, and burnt bones have been found on a layer of black earth, with fragments of a single urn. There are also three curious parallel banks of earth across a valley formed of gravel, there being a layer of white clay above the natural soil. Dr. Thos. Walker sent notes on the discovery of a remarkable bronze figure of Roman date, a horse and its rider, exhibited on a former occasion and again now. It is in perfect preservation, and it was found not far from the borders of the Nene, near Castor, beside the line of what was perhaps a summer camp of the Roman troops stationed at Durobrivae. In the author's absence the paper was read by Mr. W. de Gray Birch, F.S.A. A second paper was then read by Dr. Brushfield, on the punishment formerly known as the drunkard's cloak, of Newcastle-upon-Tyne. The cloak consisted of a tub or barrel, which was placed over the delinquent, who was then made to walk about the streets of the town. No other instance of this rough mode of punishment appears to be known in England, but many Continental cities, such as Delft, Nuremberg, Copenhagen, Dresden, &c., had similar customs. The proceedings were brought to a close by a reference to the death of Mr. George Godwin, one of the oldest vice-presidents of the Association.

Cleethorpes (Lincolnshire).— A Local Government Board inquiry was held at Cleethorpes on the 19th ult., presided over by Mr. S. H. Terry, C.E., Government Engineering Inspector. The inquiry was held to consider an application from the Cleethorpes Local Board to borrow 4,600*l.* for sewerage works, and 2,900*l.* for street works. Mr. W. H. Radford, C.E., of Nottingham, is the engineer for the sewerage works, his scheme having been chosen in open competition about twelve months ago. Mr. Radford was also appointed engineer for the street works at a special meeting of the Local Board, held on the 18th ult. The sewers provide for the drainage of Beaconthorpe Parish, and they vary in size from 12 in. to 24 in., with 30-in. iron pipe outfall opposite Park-street under the foreshore to low-water mark. The street works provide for the improvement of the main road between Cleethorpes and Grimsby. The Chairman and members of the Local Board, with their solicitor, were present, and there was no opposition. Mr. H. B. James, C.E., represented the Manchester, Sheffield, and Lincolnshire Railway Company, under whose supervision 1,000*l.* worth of the work will be constructed, as it passes under the Company's property.

The Hartshill Brick and Tile Company (Messrs. J. & T. Birks, of Stoke-upon-Trent) have sent us a copy of their new and useful pattern-book, which contains representations of several new and improved ventilating finials, ridges, &c., which can be made to go with any kind of ridge and fixed with them, thus doing away with cutting roof and loss of time in fixing zinc and wood ventilators. Pages 11 to 15 contain many new patterns of ornamental ridge tiles, and pages 23 and 24 are new sheets of terra-cotta panels, &c.

Harris Orphanage, Preston.—A large clock with Cambridge quarter chimes has just been completed at this building by Messrs. John Smith & Sons, of Derby. It shows the time upon four dials, each 5 ft. across. All the wheels have had their teeth cut from the solid, and the pinions are of hardened steel. The pendulum has a hundred-weight bob. Messrs. Garlick & Sykes, Preston, are the architects.

Leeds and Yorkshire Architectural Society.—The seventh ordinary meeting of the present session of this society was held on Monday evening last in its rooms, Infirmary-street, Leeds, when a lecture was delivered by Mr. Aston Webb, F.R.I.B.A., entitled "Signs of the Times." One of the first signs of the times, the lecturer stated, was the difficulty of reading a paper before a body of architects at all. Ten or fifteen years back there was no such difficulty. It was then only necessary for an architect to range himself on one side or the other—Gothic or Classic—to ridicule all the points of the other side, and he at once got together an interested audience, and provoked an animated discussion. This had all changed. They did not take sides now, but saw something good in all styles, and refused to abominate any particular one. The present was a time for work and not for talk. Young men entering the profession at the present day had a glorious prospect before them as compared with those who entered it a few years ago. The architectural current of the times could be denoted by the designs submitted in recent years in important competitions. School Board Schools and public baths and wash-houses had contributed to the development of certain classes of architecture. Church architecture, however had done very little towards the furtherance of the art. Comfort and convenience were not taken into consideration in the plans of churches. Church architects had been very much hampered by archæological fetters, and he could not help thinking that archæology was a drawback to the introduction of improvements. In saying that, however, he did not wish to intimate that architects had not made any attempt to rid themselves of the fetters, for many had made deviations from the old rules, and endeavoured to adapt their plans so as to meet the requirements of modern times. The different styles of architecture adopted in recent public buildings of note were dwelt upon by the lecturer, as were also those of domestic structures. —On the motion of Mr. J. W. Connon, seconded by Mr. George Corson, and supported by Messrs. W. H. Thorp, T. Butler Wilson, and J. H. Greaves, a vote of thanks was accorded to the lecturer.—A number of architectural and other drawings by Mr. T. Butler Wilson were exhibited during the evening.

Canals and Inland Navigation.—It is the intention of the Society of Arts to hold a conference in May next on the subject of canals and inland navigation. In the year 1885 an international conference on the subject was held at Brussels, and in the following year there was one at Vienna. The third meeting is to be this year at Frankfort. It is not, however, proposed that the Society of Arts Conference should be of an international character, as naturally the canals of this country are not in any way dependent on, or connected with those of other countries. Amongst the subjects set down for discussion are included the history of canals in Great Britain, the engineering of canals, the present condition of canal navigation, with suggestions for its improvement, the connexion between canals and railways, tariffs, costs of carriage, &c. It is also proposed to include in the proceedings some account of the canal systems of foreign countries, and the committee have already been promised several papers on this head. Further information as to the details of the arrangements may be obtained from the Secretary of the Society of Arts.

A Sculpture Competition in Russia.—The committee charged with the erection of a statue of Emperor Alexander II. at Moscow is in a sore dilemma, no design having as yet proved acceptable, although thirty-two have been received. The committee has now decided upon issuing a third circular of invitations for designs.

New House of Parliament in Stockholm.—The Swedish Parliament has under consideration a proposal for the building of a new House of Parliament at Stockholm, at a cost of 100,000*l*. The building will also provide accommodation for the Bank of Sweden and the Treasury. It is to be erected on a site belonging to the King of Sweden, and is estimated to take five years to finish.

The Institute of Builders.—An account of the proceedings of the last meeting of this Institute (with a *résumé* of Mr. F. J. Dove's paper on "The Relation of the Architectural Profession to the Building Trade," and a report of the discussion thereon) is in type, but is unavoidably crowded out until next week.

Surrey Archæological Society.—At the thirty-third annual general meeting of this Society, held on Wednesday, the 22nd inst., at 8, Dane's-Inn, Strand, Mr. J. W. Butterworth, F.S.A., in the chair, Mr. T. Milbourn, hon secretary, read the report of the Council, in the course of which it was stated that part second of volume 9th of the Transactions. which would complete the volume, was nearly ready for issue. The library continued to largely increase by the presentation of societies in union. The annual meeting of the Society, held at the church of St. Saviour's, Southwark, and Lambeth Palace on the 5th of July, 1887, under the presidency of the Right Hon. Viscount Midleton (President of the Society) had proved a great success, and the thanks of the Society were due to his Grace the Archbishop of Canterbury for his kind permission to visit and inspect Lambeth Palace; to Mr. Francis T. Dollman for his paper on the "History and Architecture of St. Saviour's Church"; to Mr. S. W. Kershaw, F.S.A., for his paper on "the Library and Picture Gallery at Lambeth Palace"; and to Mr. John P. Seddon, F.R.I.B.A., for his "Remarks on the Architecture of the Chapel."

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	15	0
Teak, E.I. ....load	8	0	0	12	10	0
Sequoia, U.S. ....foot cube	0	2	3	0	3	0
Ash, Canada ....load	3	0	0	4	10	0
Birch ,, ...	2	0	0	3	10	0
Elm ,, ...	3	10	0	4	10	0
Fir, Dantsic, &c.	1	10	0	4	0	0
Oak ,, ...	2	10	0	4	10	0
Canada	3	0	0	6	0	0
Pine, Canada red	2	0	0	3	10	0
,, yellow	2	0	0	4	0	0
Lath, Dantsic ....fathom	3	0	0	5	0	0
St. Petersburg	4	0	0	5	10	0
Wainscot, Riga ....log	0	0	0	0	0	0
,, Odessa, crown....	2	10	0	3	0	0
Deals, Finland, 2nd and 1st...std.100	7	10	0	9	0	0
,, 4th and 3rd	6	0	0	8	0	0
Riga	5	10	0	7	10	0
St. Petersburg, 1st yellow	8	10	0	14	0	0
,, 2nd ,, ...	7	0	0	8	0	0
,, white	6	10	0	8	10	0
Swedish	6	15	0	15	0	0
White Sea	7	0	0	16	10	0
Canada, Pine, 1st	16	0	0	24	0	0
,, ,, 2nd....	10	0	0	15	10	0
,, ,, 3rd, &c....	7	0	0	9	10	0
,, Spruce, 1st	8	0	0	9	10	0
,, ,, 3rd and 2nd....	5	0	0	7	0	0
New Brunswick, &c....	5	0	0	7	0	0
Battens, all kinds	4	0	0	10	10	0
Flooring Boards, sq., 1 in., prepared, First	0	8	0	0	11	6
Second	0	6	6	0	7	6
Other qualities	0	4	0	0	6	0
Cedar, Cuba ....foot	0	0	3½	0	0	3½
Honduras, &c.	0	0	3	0	0	3½
Australian	0	0	2	0	0	3
Mahogany, Cuba	0	0	4½	0	0	7
St. Domingo, cargo average	0	0	4½	0	0	6
Mexican ,, ...	0	0	3½	0	0	3½
Tobasco ,, ...	0	0	4	0	0	5
Honduras ,, ...	0	0	4	0	0	5
Maple, Bird's-eye	0	0	5	0	0	7
Rose, Rio ....ton	8	0	0	11	0	0
Bahia....	7	0	0	9	0	0
Box, Turkey	5	0	0	12	0	0
Satin, St. Domingo ....foot	0	0	5	0	0	9
Porto Rico	0	0	6	0	0	10
Walnut, Italian	0	0	4	0	0	5½

METALS.						
Iron—Bar, Welsh, in London...ton	0	0	0	0	0	0
,, ,, in Wales	0	0	0	0	0	0
,, Staffordshire, London	0	0	0	0	0	0
Copper—						
British, cake and ingot ....ton	77	10	0	78	0	0
Best selected	79	0	0	80	0	0
Sheets, strong....	90	0	0	0	0	0
Chili, bars	78	5	0	0	0	0
Yellow Metal....lb.	0	0	7½	0	0	7½
Lead—						
Pig, Spanish ....ton	14	12	6	0	0	0
English, common brands....	0	0	0	0	0	0
Sheet, English	15	17	6	16	2	6
Spelter—						
Silesian, special ....ton	19	15	0	19	17	6
Ordinary brands....	19	7	6	19	12	6
Tin—						
Straits....ton	166	10	0	0	0	0
Australian	166	10	0	0	0	0
English ingots	160	0	0	0	0	0

OILS.						
Linseed ....ton	18	12	6	18	15	0
Cocoanut, Cochin	28	0	0	29	0	0
Ceylon	24	15	0	0	0	0
Palm, Lagos	21	10	0	22	0	0
Rapeseed, English pale	24	15	0	0	0	0
,, brown	23	5	0	0	0	0
Cottonseed, refined	20	5	0	0	0	0
Tallow and Oleine....	25	0	0	45	0	0
Lubricating, U.S.	5	0	0	6	0	0
,, refined....	5	0	0	12	0	0
Turpentine—						
American, in casks ....cwt.	1	9	6	0	0	0
Tar—						
Stockholm ....barrel	0	15	0	0	15	6
Archangel	0	10	0	0	10	6

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BLACKHEATH.—For alterations and repairs at No. 9, The Paragon, for Mr. A. Cator. Mr. R. W. Collier, architect, 30, Lincoln's Inn-fields, W.C.:—

G. F. Havell	£887 0 0

BROMLEY.—For the erection of new warehouse and stabling at Bromley, for Messrs. Batey & Co., Limited. Messrs. Hammack & Lambert, architects:—

Ivory	£1,606 0 0
Williams & Son	1,470 0 0
David King & Son	1,350 0 0
Ashby & Horner	1,339 0 0
J. H. Johnson	1,292 0 0
Holliday & Greenwood	1,289 0 0
F. & F. J. Wood	1,273 0 0

BURSLEM.—For the erection of a six-oven manufactory, at Burslem, Staffordshire, for Messrs. Burgess & Leigh. Mr. A. R. Wood, architect, Tunstall, Staffordshire:—

Geo. A. Foster	£7,100 0 0
N. Barlow	6,900 0 0
J. Kearton	6,250 0 0
C. Smith	6,213 0 0
W. Collis	6,150 0 0
J. Procter	5,999 0 0
J. Bowden	5,975 0 0
J. Pickard	5,765 0 0
W. Cooke (accepted)	5,680 0 0
W. Grant	5,500 0 0
C. Cope	5,448 0 0

BURSLEM.—For the erection of Rockingham Works, for Messrs. Wood & Sons. Mr. A. R. Wood, architect, Tunstall:—

J. J. Longden	£1,099 0 0
J. Procter	1,098 0 0
W. Cook	1,082 0 0
Cooper & Jones	1,068 0 0
C. Cope	1,039 0 0
J. Bowden	1,025 0 0
W. Grant	1,000 0 0
J. Yorke (accepted)	995 0 0

CLERKENWELL.—For rebuilding premises, 11, Albermarle-street, St. John's-square, for Mr. John Ross:—

Bamford	£600 0 0
Allard	490 0 0
Kellaway	463 15 0
Wall Bros. (accepted)	463 14 9

DOVER.—For new school-buildings, for the Dover High School (Girls') Company, Limited. Mr. J. Osborne Smith, architect. Quantities by F. H. A. Hardcastle:—

J. J. Wise	£3,990 0 0
Barrett & Power	3,773 0 0
Kirk & Randall	3,760 0 0
T. Gregory & Co.	3,720 0 0
H. Richardson	3,641 0 0
W. Gregar	3,648 0 0
W. Bromley	3,578 0 0
Hayward & Paramor	3,577 0 0
W. J. Adcock	3,479 0 0
H. Stiff	3,445 0 0
G. H. Denne & Sons	3,250 0 0
Wallace & Sons	3,248 0 0
W. & T. Denne (accepted)	3,175 0 0

EALING.—For alterations and additions to St. John's Schools, Ealing Dean. Mr. Robert Willey, architect, 66, Ludgate-hill, E.C.:—

J. Dorey, Brentford	£546 1 3
W. H. Waters, Ealing	520 3 0
W. Stops, Ealing Dean	486 0 0
Thos. Nye, Ealing	480 7 6
H. & A. J. Jones, Ealing	390 0 0
W. Down, Ealing Dean (accepted)	323 10 3

EAST DULWICH.—For the enlargement of the Adysroad school, East Dulwich (East Lambeth AA), by 600 places, for the School Board for London. Mr. T. J. Bailey, architect:—

H. L. Holloway	£7,096 0 0
J. & C. Bowyer	7,058 0 0
W. H. Dearle	7,021 0 0
W. H. Lorden & Son	6,987 0 0
C. Wall	6,691 0 0
Stimpson & Co.	6,680 0 0
W. Downs	6,649 0 0
W. Johnson	6,564 0 0
J. O. Richardson	6 242 0 0
J. Holloway*	6,240 0 0

* Recommended by the Works Committee for acceptance, at 5,473*l*. 7s., after deducting "provisions."

FOREST HILL.—For new Wesleyan Chapel, Forest Hill, for the trustees. Mr. Charles Bell, architect, 9, New Broad-street, E.C.:—

Williams	£3,239 0 0
Gregar	3,237 0 0
J. Waddington	3,197 0 0
Holloway	3,194 0 0
Green & Lee	3,150 0 0
Bowyer	3,134 0 0
Smith & Sons	3,096 0 0
Higgs	3,090 0 0
Halliday & Co.	3,090 0 0
Allen & Sons	2,842 0 0

GREENWICH.—For the enlargement of the Haseltine-road school, Bell Green (Greenwich AM1), by 400 places, for the School Board for London. Mr. T. J. Bailey, architect:—

W. H. Dearle	£4,348 0 0
J. Waddington	4,300 0 0
W. H. Lorden & Son	4,137 0 0
J. & C. Bowyer	4,089 0 0
Stimpson & Co.	3,960 0 0
Kirk & Randall	3,932 0 0
H. L. Holloway	3,880 0 0
C. Wall	3,850 0 0
W. Johnson	3,797 0 0
J. O. Richardson	3,729 0 0
J. Holloway*	3,728 0 0

* Recommended by the Works Committee for acceptance at 3,167*l*. 2s. 11d., after deducting "provisions."

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Clock Tower and Drinking Fountain	Newmarket Jubilee Com	10*l.*	March 10th	ii.
Technical School, Blackburn	The Building Committee	1st, to carry out work; 2nd, 100*l.*; 3rd, 50*l.*	April 14th	ii.
Enlargement of the Guildhall	Cambridge Cor.	50 guineas	May 12th	x.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Earthenware Sewer-Pipes	Belfast Town Council	J. C. Bretland	Feb. 28th	ii.
Wood Paving	Chelsea Vestry	G. R. Strachan	do.	ii.
Fire Brigade Station	West Ham Council	Lewis Angell	do.	ix.
Works and Materials	Hammersmith Vestry	*Official*	Feb. 29th	ix.
Removal of Street and House Refuse	do.	do.	do.	ix.
Raising Vestry's Wharf, &c.	do.	do.	do.	ii.
Timber Supply	Great Western Ry. Co.	do.	March 2nd	x.
Rebuilding Almshouses, Acton	.....	E. Monson, Jun.	do.	xvi.
Aberdeen Granite Cubes	Paddington Vestry	*Official*	March 5th	x.
Foreman's Cottage and Cart Sheds, &c.	Hornsey Local Board	T. De Courcy Meade	do.	x.
Works at Sanitary Depot	do.	do.	do.	ii.
Works and Materials	do.	do.	do.	x.
Workshop Fittings	Met. Asylums Board	A. & C. Harston	do.	xvi.
Hot-Water Warming Apparatus	do.	do.	do.	xvi.
Annual Contracts	Lewisham Bd. of Works	*Official*	March 6th	x.
Sewerage and Drainage Works	Reading U. S. A.	A. W. Parry	do.	ix.
Reconstruction of Bridge	Justices of the Peace, Parts of Holland (Lin.)	*Official*	March 7th	x.
Road Materials	Cranbrook R. S. A.	do.	do.	x.
Road-Making and Paving Works	Fulham Vestry	J. P. Norrington	do.	x.
Works and Materials	do.	do.	do.	x.
Sewering, &c., of Road	Chiswick Local Board	A. Ramsden	do.	x.
Works and Materials	do.	do.	do.	x.
Chocolate Cases	Admiralty	*Official*	March 8th	x.
Road Materials	Tonbridge Highway Bd.	do.	March 10th	ix.
Cranmore and Hartshill Stones	Abingdon Highway Bd.	C. Tame	do.	x.
Additions to Schools, &c.	Lingfield School Board	Langston & Lowdell	do.	xvi.
Making-up Road	Harrow Local Board	F. N. Cowell	March 13th	xvi.
Forage, Road Materials, and Repairing Pipes	Tottenhm Local Board	*Official*	do.	ii.
Pipe-Sewer	do.	J. E. Worth	do.	ii.
Wrought-Iron Water Race	do.	do.	do.	ii.
Sewer and Drainage Works	St. George the Martyr, Southwark	*Official*	do.	x.
Sundry Works at Union Workhouse	Bromley Union	John Ladds	March 15th	x.
Sewerage and Sewage Disposal Works	Reverley Town Council	Brundell & Co.	March 17th	xvi.
New Cavalry Barracks, Dublin	War Department	*Official*	Not stated	ii.
Warming Apparatus	School Brd. for London	do.	do.	x.
Execution of Works	do.	do.	do.	x.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page
Assistant Clerk of Works	Fulham Vestry	2*l.* 12*s.* 6*d.* per week	Feb. 29th	xiv.

ISLINGTON.—For the erection of model residences, Caledonian-square, N., for Mr. Stuckey. Mr. Banister Fletcher, architect:—

Williams, Son, & Wallington	£23,400 0 0
G. Shaw	17,900 0 0
Lucas Bros.	17,750 0 0
Wall Bros.	17,697 0 0
Holland & Hannen	16,950 0 0
E. Lawrence & Son	16,830 0 0
Perry & Co.	15,987 0 0
M. Gentry	15,810 0 0
J. O. Richardson	14,729 0 0

ISLINGTON.—For rebuilding part of Nos. 61 and 63, Park-street, for Mr. Rackstraw. Mr. F. Taprell, surveyor:—

Goodman	£974 0 0
Coombes	948 0 0
Staines & Son	874 0 0
Downs	870 0 0

KENSINGTON.—For the erection of mansions at Earl's Court-square, Kensington, S.W., for Mr. J. Halley. Mr. John MacLaren, architect, 21, King William-street, Strand. Quantities by Messrs. Evans & Deacon, 1, Adelaide-street, Charing Cross, W.C.:—

	First Block.	Second Block.	Third Block.	Total for 3 blocks.
Abley	£4,438	£4,400	£4,400	£13,238
Foster & Dicksee	4,222	4,111	4,000	12,333
Hill Bros.	4,180	4,130	4,060	12,390
Holliday & Greenwood	3,993	3,950	3,900	11,843
Brickell	3,950	3,850	3,750	11,550
Kearley	3,835	3,815	3,750	11,400
Harris & Wardrop	3,743	3,700	3,683	11,126
Jervis Smith	3,600	3,515	3,475	10,600

KENSINGTON.—For new drainage, finishing and completing Nos. 109 and 111, Comeragh-road, West Kensington, for Messrs. Hoare & Co. Rogers, Chapman, & Thomas, surveyors, Belgrave-road, S.W.:—

Smith & Sons	£996 0 0
Lorden & Sons (accepted)	897 0 0

LEATHERHEAD.—For the erection of new store, North-street. Mr. Resta W. Moore, architect, Worthing:—

W. H. Batchelar	£473 0 0
G. & W. Brown	359 0 0
H. Skillon (accepted)	289 15 0

LINCOLN.—For additions to house, for Mr. Tomlinson. Mr. H. Barnes, architect and surveyor:—

Morgan	£170 0 0
Tattershall	165 15 5
Kitchen	165 12 0
Whelpton	161 0 0
Lansdown & Son	157 0 0
Green, Washingborough	155 0 0
H. S. & W. Close	153 10 0
Horton Bros.	147 0 0
Cowen	147 0 0
Harrison, Foss-street (accepted)	145 0 0

LONDON.—For pulling down and rebuilding No. 37, Aldermanbury. Mr. Delissa Joseph, architect, 17, Basinghall-street, E.C. Quantities by Messrs. W. E. & F. Brown:—

A. W. Hammond	£2,284 0 0
Turtle & Appleton	2,160 0 0
B. Hosegood	2,145 0 0
J. Grover & Son	2,098 0 0
S. C. Parmenter	2,070 0 0
Patman & Fotheringham	1,963 0 0
J. Woodward	1,949 0 0
W. Brass & Son	1,893 0 0
J. Allen & Son (accepted)*	1,858 0 0

* With 31*l.* extra for Portland stone.

LONDON.—For various additions, alterations, new drainage, decorations, and general repairs to the premises, No. 55, Belgrave-road, Belgravia:—

E. D. Hook (accepted)	£1,169 4 0

LONDON.—For new drainage and sanitation, decorations, and other repairs to the premises, No. 109, St. George's-square, S.W., and stable, for Mr. Wm. Chambers:—

E. D. Hook (accepted)	£346 0 0

LONDON.—For additions to warehouse, 78-82, Kingsland-road, N., for Messrs. Darnell & Son. Mr. Geo. Baines, architect, 4, Great Winchester-street, E.C.:—

J. Ivory	£695 0 0
W. Shurmur, Prospect House, Lower Clapton (accepted)	648 0 0

LONDON.—For the erection of a caretaker's house on premises, Garford-street, Poplar. Mr. Joseph Harris, architect, Bow:—

A. Timson (accepted)	£220 0 0

LONDON.—For the erection of four houses, White-street, Bethnal Green, for Mr. P. J. Dixon. Messrs. Thos. & Wm. Stone, architects, 2, Great Winchester-street, London-wall, E.C.:—

Dabbs	£1,495 0 0
Rome	1,432 0 0
Beale, Cambridge Heath	1,320 0 0
Jarvis & Sons, Hackney-road	1,316 0 0
Forrest, Cambridge-road	1,287 0 0
Higgs, Bethnal Green-road	1,180 0 0
Hawkins, Mile End-road	1,159 0 0
Knight & Sons, Bethnal Green*	997 0 0

* Accepted.

LONDON.—For decorations, repairs, &c., at 113, Gloucester-terrace, Hyde Park. Mr. William Wimble, architect, 9, Queen Victoria-street, E.C.:—

	Interior.	Exterior.	Total.
Vears	£230 0 0	£66 0 0	£296 0 0
Faulkner	127 0 0	48 0 0	175 0 0
Greatorex & Co.	124 14 6	49 4 0	173 18 6

RICHMOND (Surrey).—For making-up Lower Montague-road. Mr. Walter Brooke, Assoc.-Mem. Inst. C.E., Town Surveyor:—

L. Bottoms	£794 0 0
J. Rigby	660 0 0
G. Killingback	657 0 0
E. & W. Iles	635 0 0
S. Atkins	620 0 0
G. Alldred	611 0 0
J. Munro	601 12 0
J. Bloomfield	600 0 0
Nowell & Robson	595 0 0
J. Mowlem & Co.	590 0 0
G. Neale & Co., Wandsworth*	576 0 0

[Surveyor's approximate estimate, £554.]

* Accepted.

STOKE-ON-TRENT.—For the erection of a villa-residence at Stoke-on-Trent, for Mr. S. Hartshorn. Mr. A. R. Wood, architect, Tunstall:—

J. Procter	£658 0 0
Booth & Critchlow	640 0 0
R. Bradbury	637 10 0
J. Breeze	614 10 0
G. W. Hancock	600 0 0
J. Kearton	595 0 0
J. Yorke	578 10 0
J. J. Longden	574 10 0
Cooper & Jones	569 10 0
Yoxall & Heath	524 10 0
C. Cope	523 0 0

STRATFORD.—For new show-rooms, for Mr. C. Boardman, Grove House, Broadway, Stratford, E. Mr. Geo. Baines, architect, 4, Great Winchester-street, E.C.:—

W. Gregar	£1,867 0 0
A. Reed	1,858 0 0
S. J. Scott	1,847 0 0
Mark Gentry, 2, Wormwood-street, E.C. (accepted)	1,495 0 0

STREATHAM.—For alterations, repairs, decorations, and sanitary work at St. Anne's Home, Streatham Hill, for the Guardians of the Poor of St. Pancras. Mr. H. H. Bridgman, architect;—

R. Soper	£3,172 0 0
Patman & Fotheringham	3,022 0 0
Garrett & Son	2,299 0 0
E. Procter	2,122 0 0
Candler & Son	2,120 0 0
E. C. Ackerman	2,114 0 0
Crabb & Son	2,087 0 0
F. W. Dixon	1,965 0 0
G. Uwins	1,919 0 0
S. R. Lamble	1,801 0 0
H. R. Ockenden	1,799 0 0
J. Pearce	1,682 0 0
Lorden & Son	1,497 0 0
H. Haynes	1,372 0 0
Wall Bros.	1,317 0 0
W. G. Lilly	1,305 0 0
W. A. Rhodes	1,302 0 0
F. R. Mayo	1,247 0 0
Neave & Neave	1,239 0 0
W. Dudley	1,233 9 5
G. Foxley	1,212 0 0
Newton & Idle	1,209 0 0
Richards	1,202 0 0
C. Willmott	1,114 0 0
Scharien & Co. (accepted)	1,070 0 0
E. F. Henderson	1,016 16 3

For laundry fittings, cooking apparatus, hot-water supply, and engineer's work generally, at the above, forming a separate contract. Mr. H. H. Bridgman, architect:—

Rosser & Russell	£488 0 0
May Bros. (accepted)	463 10 0

SYDENHAM.—For erecting new shop, Newlands Park, Sydenham, for Mr. Bigwood. Mr. J. W. Brooker, architect:—

Battley	£837 0 0
Garratt	780 0 0
Croaker	764 0 0
Waddington	725 0 0
Kick	724 10 0

TUNSTALL.—For the construction of a 12-in. pipe-sewer, with manholes, in Station-road, Tunstall, for the Tunstall Local Board of Health. Mr. A. R. Wood, Town Surveyor:—

J. Mackay	£272 14 0
Chas. Smith	230 10 0
Chas. Cope	222 0 0
Samuel Smith (accepted)	219 0 0

TUNSTALL.—For the sewering, kerbing, channelling, paving, and macadamising of Bank-street, Tunstall, for the Tunstall Local Board of Health. Mr. A. R. Wood, Town Surveyor:—

J. Williamson & Sons	£675 0 0
S. Smith	619 0 0
J. Mackay (accepted)	612 14 0
C. Cope	598 0 0
Chas. Smith	595 0 0

TUNSTALL.—For the alterations and additions to High Gate Pottery, Tunstall, for the executors of the late Mr. James Emberton. Mr. A. R. Wood, architect, Tunstall:—

S. Cartlidge	£1,400 0 0
R. Hilditch	946 10 0
J. J. Longden	930 0 0
C. Smith	920 0 0
Booth & Critchlow	900 0 0
W. Bainbridge	899 0 0
J. Yorke	898 0 0
J. Kearton	866 0 0
C. Cope	846 0 0
W. Grant	830 0 0
Cooper & Jones	829 0 0
J. Procter (accepted)	820 0 0

WALTHAMSTOW.—For partly pulling down and rebuilding an addition to house at Hale End, for Mr. James Greig. Mr. Charles Dunch, architect. Quantities by Mr. James F. Wesley, Romford-road, Forest Gate, E.:—

Grover & Son	£1,688 0 0
Egan	1,670 0 0
Colls & Son	1,599 0 0
J. Morter	1,585 0 0
Ashby & Horner	1,581 0 0
Patman & Fotheringham	1,573 0 0
J. & J. Greenwood	1,555 0 0
W. Watson	1,500 0 0
B. E. Nightingale	1,480 0 0
Atherton & Latta	1,450 0 0
Harris & Wardrop	1,394 0 0
Capel	1,380 0 0

WOLSTANTON.—For the completion of the Barony, Watlands Park, Wolstanton, for Mr. Thomas Bostock. Mr. A. R. Wood, architect, Tunstall:—

Yoxall & Heath	£750 0 0
W. Cooke	744 0 0
Cooper & Jones	710 0 0
Rose Vale Co.	699 0 0
C. Cope	696 0 0
J. Bowden	666 0 0
W. Grant	650 0 0
J. Yorke	648 0 0
J. Kearton (accepted)	639 0 0

WORTHING.—For the erection of new villa, Christchurch-road. Mr. Resta W. Moore, architect:—

W. Stanbridge	£870 0 0
O. Moore	770 0 0
W. Kennard (accepted)	630 0 0

WORTHING.—For new class-room at St. George's Parochial School. Mr. R. W. Moore, architect:—

C. C. Cook (accepted)	£125 0 0

WORTHING.—For new class-rooms at the Baptist Sunday School. Mr. R. W. Moore, architect:—

J. Blaker	£139 0 0
W. Kennard	136 6 0
J. Adams	124 0 0
W. Stanbridge	118 12 6
Inkpen & Sons (accepted)	116 11 6

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Now ready.

READING CASES, { NINEPENCE EACH. By post (carefully packed), 1s.

London temp. Henry VIII. (With Key).

Price Eightpence; by post, 10d.

New Reredos, St. Paul's Cathedral.

Price Sixpence; by post 8d.

Portrait of the late Mr. Geo. Godwin.

Price Sixpence; by post, 8d.

The above Plates (reprinted from the *Builder*), on stout paper, unfolded and suitable for framing, are now ready, and will be sent, carefully packed on receipt of stamps; or they may be ordered through any Newsvendor.

N.B.—The NEW YEAR'S NUMBER (Jan. 7, 1888) is OUT OF PRINT.

FIRE BRICKS.

STOURBRIDGE BEST FIRE BRICKS, 80s. *M.*
Ditto FIRE CLAY, 25s. a ton.
Also in Stock: Fire Lumps, Fire Tiles, Boiler Seatings, and Flue Covers.
R. CULL & SON, Manufacturers,
City Stores:—Midland Railway Depôt, Royal Mint-street, Tower Hill, E.C.
City Office:—72, Palmerston-buildings, Old Broad-street, E.C.

GLAZED BRICKS.

Best quality—White Headers at 9*l.* 5s. *M.*
Stretchers at 10*l.* 5s. *M.* Quoins and Bullnose at 11*l.* 15s. *M.*
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City Stores:—Midland Railway Depôt, Royal Mint-street, Tower Hill, E.C.
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BLUE BRICKS.

Common Blue Bricks at 55s. *M.* Best Pressed Blue Facings at 65s. *M.*
Bullnose and Stable Pavings at 70s. *M.*
Plinths, Copings, Channels, &c. in Stock.
R. CULL & SON,
City Stores:—Midland Railway Depôt, Royal Mint-street, Tower-hill, E.C.
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DRAIN PIPES.

4-inch. 3d. 6-inch. 4d. 9-inch. 7d. 12-inch. 11d. per ft.
Subject to a large discount for railway truck loads.
Bends, Junctions, Syphons, Gullies, &c. Kitchen Sinks, Closet Pans, &c. in Stock.
R. CULL & SON,
City Stores:—Midland Railway Depôt, Royal Mint-street, Tower-hill, E.C.
City Office:—72, Palmerston-buildings, Old Broad-street, E.C.

Best Bath Stone.

CORSHAM DOWN. | FARLEIGH DOWN.
BOX GROUND. | COMBE DOWN.
WESTWOOD GROUND. | STOKE GROUND.
The BATH STONE FIRMS, Limited.
HEAD OFFICES: BATH.

Doulting Freestone.

THE CHELYNCH STONE. The stone from these quarries is known as the "Weather Beds," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England.

THE BRAMBLEDITCH STONE. Is of the same crystalline nature as the Chelynch Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.

Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset.
London Agent — Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [ADVT.

Doulting Free Stone HAM HILL STONE, BLUE LIAS LIME (Ground or Lump), For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Stoke-under-Ham, Ilminster. [ADVT.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [ADVT.

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
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LITHOGRAPHERS AND PRINTERS,
Estate Plans and Particulars of Sale promptly executed.
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Garside's Noted Bedfordshire Coarse and Fine Silver Sand.—Is perfectly free from impurity, and the best and cheapest in the market. All qualities in stock, for every purpose required in the building trade, for filtration, or for nursery purposes. All pure grit!
Apply to
GEORGE GARSIDE, JUNR.,
Leighton Buzzard. [ADVT.

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121, Bunhill-row, London, E.C.
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LASCELLES' CONCRETE,
CONSERVATORIES AND GREENHOUSES.
Estimates given on Application.

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Timber Merchants, 17, Gracechurch-street, E.C.
Dry Deals, Flooring, Matchboards, Doors, and Mouldings. Country orders promply executed.
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STEEL SAFES, STRONG-ROOM & PARTY-WALL DOORS.

SELF-CLOSING DOORS, FOR THEATRES AND PUBLIC BUILDINGS,
As approved by the Metropolitan Board of Works (used in large numbers at Covent Garden Theatre).

IMPORTANT COMMUNICATION.—FIRE AT WHITELEY'S.

WILLIAM WHITELEY, Westbourne Grove,
London, Oct. 12th, 1887.

HOBBS, HART, & CO., LIMITED.

GENTLEMEN.—It affords me very much pleasure to express to you my satisfaction and admiration at the splendid fire-resisting powers of your Strong-room doors and the Safes.

The recent fire at my establishment in my opinion subjected them to the greatest possible test, and through all, they proved invulnerable.

The contents of both Strong Rooms and Safes were entirely preserved, although the fire was of such intense destructive force.

You will be pleased to hear that it has been decided to adopt your Patent Clutch-rebated Doors for all the party-walls in the new buildings now in course of erection.—I am, Gentlemen, faithfully yours,

(*Signed*) WILLIAM WHITELEY.

Offices and Warehouse: 76, CHEAPSIDE, London; Manufactories, Wharncliffe Works, Arlington-street, London, N.